In the Office of Endangered Species
Fish and Wildlife Service
United States Department of Interior

American Wildlands
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Clearwater Biodiversity Project
Idaho Watersheds Project, Inc.
Montana Environmental Information Center
Pacific Rivers Council
Trout Unlimited, Madison - Gallatin Chapter
Bud Lilly

Petitioners

Date:________________________________

Petition for a rule to list the westslope cutthroat trout (*Oncorhynchus clarki lewisi*) as threatened throughout its range.

American Wildlands, Clearwater Biodiversity Project, Idaho Watersheds Project, Montana Environmental Information Center, the Pacific Rivers Council, Trout Unlimited's Madison-Gallatin Chapter and Bud Lilly (petitioners) formally petition to list the westslope cutthroat trout (*Oncorhynchus clarki lewisi*) as threatened throughout its range pursuant to the Endangered Species Act (ESA), 16 U.S.C. Secs. 1531 et seq. This petition is submitted under 5 U.S.C. Sec. 553(e) and 50 C.F.R. Sec. 424.14 (1990), which grant interested parties the right to petition for issue of a rule from the Assistant Secretary of the Interior.

Petitioners also request that critical habitat be designated for the westslope cutthroat trout concurrently with the listing of threatened throughout its range, pursuant to 16 U.S.C. Sec. 1533(a)(3)(A) and 50 C.F.R. Sec. 424.12.

PETITIONERS

Petitioner American Wildlands(AWL)is a regional non-profit conservation organization focusing primarily on natural resource issues in the Rocky Mountain West. AWL's membership is dedicated to the protection and stewardship of America's public lands: preserving and restoring biodiversity and promoting sustainable management. Many of our members engage in a variety of recreational uses of our public lands and waters in the Northern Rockies that are enhanced by the presence of the westslope cutthroat trout (WCT), including fishing, kayaking, canoeing, hiking, and camping. Our members are concerned about the critical condition of the WCT, its degraded habitat, and the lack of sufficient action to protect the WCT. The main office of American Wildlands is located at 40 East Main, Suite 2, Bozeman, MT, 59715. Our phone number is (406) 586-8175.

Clearwater Biodiversity Project (CBP) is a public interest group working on timber, wildlife and fisheries issues in the Clearwater sub-basin of the Snake River. Clearwater Biodiversity Project focuses on influencing public lands management in the sub-basin by participating in the decision-making process for timber sales, conducting public education activities such as slide shows and informational programs for schools, and informing the media of their activities so that the regional public can be better informed regarding the status of our national and state endowment of wild forests, clean water and rich and secure populations of flora and fauna. The decline and continuing threats of westslope cutthroat trout and its habitat has been of especial interest to CBP. CPB can be reached at: 1031 Spring Valley Rd., Troy, ID 83871, phone (208) 835-2999.

Idaho Watersheds Project, Inc. (IWP) is a 501(c)3 non-profit corporation in Idaho with about 500 members. The mission of IWP is to acquire, protect, and restore Idaho public school endowment lands which have been degraded by livestock abuse, to improve returns to the Idaho school endowment fund, and to raise public consciousness regarding the importance of all our shared public lands and waters as well as the plants and animals which depend on them. In May 1996 the Board of IWP extended our mission area to include all public lands in Idaho watersheds, including areas in Wyoming, Montana, Nevada, Utah and Oregon. Because the members of IWP are involved in many recreational activities on lands which include habitat for the WCT and because our members are acutely aware of the degraded habitat conditions on critical streams which support this species and other declining native fishes, IWP has a direct interest in protecting WCT. IWP has one office located at 16 West Croy St., Hailey, ID 83333. Our telephone is (208)

788-2290.

The Montana Environmental Information Center (MEIC) is a nonprofit organization founded in 1973 with members throughout the United States and the State of Montana. MEIC is dedicated, in part, to the preservation and enhancement of the natural resources and natural environment of the State of Montana and to the gathering and disseminating of information concerning the protection and preservation of the human environment through education of its members and the general public concerning their rights and obligations under state and federal environmental law. MEIC is also dedicated, in part, to assuring that state and federal officials comply with and fully uphold the laws of the United States and the State of Montana which are designed to protect and ensure the preservation of native species. As such, MEIC has a specific interest in the protection of westslope cutthroat trout throughout its range. MEIC's address is P.O. Box 1184, Helena, MT 59624 and phone number is 406-443-2520.

The Pacific Rivers Council (PRC) is a 501(c)(3) non-profit public interest organization whose mission is the maintenance, protection and restoration of native fishes and other aquatic species through the adoption of an aquatic strategy that relies upon principles of conservation biology and considers the entire watershed an integral component of a healthy stream. PRC has offices in Eagle, ID; Bozeman, MT; Eugene, OR; Portland, OR; and Washington, D.C. Contact PRC at P.O. Box 10798, Eugene, OR 97440 or phone 541-345-0119.

Trout Unlimited, Madison-Gallatin Chapter is a 501(c)(3) non-profit public interest organization. The Chapter's membership area encompasses the Madison and Gallatin River drainages, both of which are in the historic range of westslope cutthroat trout. The mission of the Chapter is to conserve, protect and restore the coldwater fishery resource and its associated watersheds. The Madison-Gallatin Chapter is the largest TU chapter in the state of Montana with over 400 members. The Chapter can be contacted at P.O. Box 52, Bozeman, MT 59771-0052 and its phone is 406-586-9111.

Bud Lilly, fly-fishing guide and conservationist, has fished the streams of his native Montana for more than fifty years, and he's probably the most famous trout-fishing guide in America. His Trout Shop in West Yellowstone was internationally known for tackle, guide services, and hospitality. He was founding president of Montana Trout Unlimited, first chairman of the International Fly Fishing Center, a founder of the Montana Trout Foundation, has for many years been a senior advisor of the Federation of Fly Fishers, and is a director of the Greater Yellowstone Coalition. Bud lives at 2007 Sourdough Road, Bozeman, MT 59715.

INTRODUCTION

The westslope cutthroat trout (*Oncorhynchus clarki lewisi*) is an important part of our natural heritage. It is a unique native species that specially adapted to changing conditions as it colonized the inland northwest during the last glaciation. There is evidence that WCT may have arrived before this time (Shepard, pers. comm. 1996). It evolved as the most widely distributed native trout throughout this region. Early isolation made the westslope cutthroat trout distinct among several other recognized cutthroat subspecies (Leary et al. 1987, Allendorf and Leary 1988).

Current distribution and abundance of the westslope cutthroat trout are severely restricted compared with historical conditions (McIntyre and Rieman 1995), and populations continue to decline at an alarming rate. Pure WCT are extinct throughout most of the subspecies' historic range, and existing populations are in imminent danger from land-use activities and non-native species. Reasons for the critical condition of the WCT include habitat destruction from logging, road building, grazing, mining, urban development, agriculture and dams, competition, predation and hybridization from introduced non-native fish species, over fishing, and the introduction of hatchery strains. Habitat degradation and the introduction of non-native fishes "has disrupted the historical harmony of the native trout with its physical and biological environment, causing dramatic declines in the distribution and abundance of WCT throughout most of its range" (Behnke 1992).

The best scientific and commercial data available support a listing as threatened throughout its range with concurrent critical habitat designation for the WCT. There are few viable populations remaining, and adequate protective and restorative programs do not currently exist. Although it is well known that land management activities and non-native species pose the greatest threats to WCT, both a sensitive and management indicator species on federal lands as well as a species of special concern in state waters, populations continue to be put into jeopardy by a variety of proposed activities and ongoing projects and programs. Because most remaining populations are small and fragmented, they are more prone to extinction from genetic loss and catastrophic events and would be unable to re-colonize once extirpated.

Many recent studies, peer-reviewed scientific papers, and state and federal agency reports indicate that the decline of WCT continues and that threats to its existence are pervasive and ongoing. This new information, which has not been previously considered by the Service, forms the basis for the petition.

Most of the new facts and material indicate few remaining WCT populations are protected from natural and human impacts that will allow the species to maintain its long-term viability.

CLASSIFICATION AND NOMENCLATURE

Initially, there was some confusion in the classification of the westslope cutthroat trout. Although a distinct form, it was often identified with the Yellowstone cutthroat trout, *Oncorhynchus clarki bouvieri*. However, *Oncorhynchus clarki lewisi* (Girard) is the correct sub-species name for the westslope cutthroat trout (Behnke 1992). Identification based on spotting pattern is corroborated by a distinctive karyotype (66 chromosomes) and electrophoretic data (Behnke 1992). The subspecies, *lewisi*, represents a major divergence in the phylogeny of the species (Behnke 1992). Genetic divergence between westslope cutthroat trout and other cutthroat subspecies exceeds that typical of other conspecific fish (Leary et al. 1987, Allendorf and Leary 1988; Rieman and Apperson 1989).

The subspecies *alpestris*, known as the "mountain cutthroat trout", is considered a synonym of *lewisi* (Trotter 1987; Behnke 1992). It is part of a band of disjunct westslope populations extending from the John Day River drainage in eastern Oregon into British Columbia (Trotter 1987; Behnke 1992).

PRESENT LEGAL STATUS

Westslope cutthroat trout were originally on the United States Fish and Wildlife Service's (Service) "Red Book" of threatened and endangered species. The WCT was dropped from the list with the passage of the Endangered Species Act in 1973 due to the uncertainties concerning classification mentioned above (Roscoe 1974; Draft Habitat Conservation Assessment for WCT 1995, from now on DHCA for WCT).

Until recently, the WCT was considered a Category 2 species by the Service throughout its range. Due to changes in the classification system, it is presently considered a species of concern/species at risk by the Service. It is considered a species of special concern by the Idaho Department of Fish and Game (IDFG) (Moseley and Groves 1990; McIntyre and Rieman 1995) and the Montana Department of Fish, Wildlife and Parks (MDFWP), and sensitive by Regions 1 and 4 of the USDA Forest Service, the USDI Bureau of Land Management (BLM), and the Oregon Department of Fish and Wildlife (ODFW).[1] **a. Significant current or predicted downward trends in population numbers or density.**

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[1] **A sensitive species is one for which population viability is a concern as evidenced by:**

b. Significant current or predicted downward trends in habitat capability that would reduce a species existing distribution. This subspecies' status by both federal and state agencies is predicated on the knowledge that as a whole, the trend is declining for this subspecies throughout its range (Van Eimeren 1996b).

LIFE HISTORY

Three life history forms of WCT have been recognized: adfluvial, fluvial, and resident (Trotter 1987; Liknes and Graham 1988; Behnke 1992; McIntyre and Rieman 1995). They are distinguished by behavioral rather than morphological differences (Liknes 1984). Spawning occurs from March to July at water temperatures near 10 C (Liknes 1984; Shepard et al. 1984; Trotter 1987; Behnke 1992; McIntyre and Rieman 1995).

Adfluvial fish spawn and rear in tributaries and mature in lakes (Shepard et al. 1984). They are native to the four large natural lakes within its range in the upper Columbia River drainage - Coeur d'Alene, Priest, Pend Oreille, and Flathead Lakes. (Behnke 1992; McIntyre and Rieman 1995; Corsi, pers. comm. 1996). WCT from these lakes may migrate upstream 150 km or more to spawn in upper tributary creeks (Behnke 1992).

Fluvial fish spawn and rear in tributaries and emigrate to main rivers as adults. They can also migrate considerable distances. While some may remain in their natal tributary during the summer, most return to the main river after spawning. (Rieman and Apperson 1989; Behnke 1992; McIntyre and Rieman 1995).

Resident fish spend their entire lives in tributaries. They are usually smaller than the migratory types, and their home territory may be small, approximately 20 yards(Trotter 1987). However, they will move much greater distances if good winter habitat is lacking (Brown and Mackay 1995). Growth is generally greater for migrant forms than resident (McIntyre and Rieman 1995).

Adfluvial and fluvial juveniles spend approximately 2-3 years in their natal tributary before migrating to the lake or stream. However, they have been known to migrate as early as 1 year and as late as 4 years of age. They typically mature at age 3, and spawn first at age 4-5. (Behnke 1992; McIntyre and Rieman 1995). There are very few repeat spawners (Shepard et al. 1984,

Trotter 1987), although alternate-year spawning has been reported (Shepard et al. 1984; McIntyre and Rieman 1995).

There can be considerable movement to find overwintering habitat (Brown and Mackay 1995). Winter habitat consists of adequate cover, such as large boulders or pieces of rubble in the substrate (Trotter 1987) and pools (Corsi, pers. comm., 8/5/1996). Little or no movement has been observed in systems with an abundance of high quality pools that could be used for winter habitat (Mauser 1972; Peters 1988; McIntyre and Rieman 1995).

The presence of both resident and fluvial life histories contributes to population viability and reduces the risk of extinction (Hungry Mill Timber Sales, FEIS. April, 1996. Nez Perce National Forest, Idaho). A species' extinction is less likely to occur from a series of localized extinctions with an interacting group of local populations. The migratory forms appear to have suffered the greatest losses of this subspecies (Van Eimeren 1996b). Thus, recolonization of extirpated local populations is much more tenuous today.

Resident forms act as gene reservoirs and are often in isolated areas. Resident forms are more likely to be extirpated from catastrophic events unless a migratory component of the population is present to recolonize the area. Maintenance of both resident and migratory stocks reduces the risk of extinction.

HABITAT REQUIREMENTS

Westslope cutthroat trout generally inhabit cold nutrient poor waters (Liknes and Graham 1988; Rieman and Apperson 1989; McIntyre and Rieman 1995). Today, they tend to occupy higher elevation streams with lower gradients and velocities (Rieman and Apperson 1989), and are negatively correlated with stream order (Upper SFSR and Johnson Creek Watershed

Analysis, March 1995). However, when other species are present, WCT were observed in moderate to high gradient areas (Shepard et al. 1984).

WCT distribution is strongly associated with pools (Shepard 1984; Pratt 1984; Peters 1988; Ireland 1993; McIntyre and Rieman 1995) and cover (Griffith 1970; Pratt 1984; Shepard 1984; Lider 1985; McIntyre and Rieman 1995). During winter larger fish congregate in large numbers in pools (Lewynsky 1986; Brown and Mackay 1995; McIntyre and Rieman 1995), and small fish use cover provided by interstitial space in the substrate (Wilson et al. 1987; Peters 1988; McIntyre and Rieman 1995).

Substrate composition strongly influences survival (McIntyre and Rieman 1995). Spawning areas are primarily composed of gravel that ranges in size from 2 to 75 mm, in mean depths from 17 to 20 cm, and in mean velocities between .30 and .40 m/s (Liknes 1984; McIntyre and Rieman 1995).

HISTORICAL DISTRIBUTION (See Appendix A)

WCT have the largest original distribution of all the subspecies of cutthroat trout in the Basin (Lee et al. 1996). The known range of the WCT east of the Continental Divide includes the upper South Saskatchewan river basin south of, and including, the Bow River in the Hudson Bay drainage (Carl et al. 1977), and the upper Missouri basin (main river and all tributaries) east to about Fort Benton, Montana, about 60 km below Great Falls, including the headwaters of the Judith, Milk, and Marias rivers, which join the Missouri downstream from Fort Benton. Also some headwaters of the Missouri basin in northwestern Wyoming and southern Alberta (Liknes 1984; Liknes and Graham 1988; Leary et al. 1991; Behnke 1992).

West of the Continental Divide the WCT is native in all the major drainages of the Columbia River basin (Leary et al. 1991; Behnke 1992). This includes the upper Kootenai River drainage from the headwaters in British Columbia to below the confluences of the Moyie and Elk rivers (Liknes and Graham 1988; Behnke 1992) and the upper Fraser system (Carl et al. 1977). The original distribution included the entire Clark Fork drainage of Montana and Idaho downstream to the falls on the Pend Oreille River near the Idaho-Washington border (Behnke 1992). They were once the most common salmonid in streams of central and northern Idaho (Rieman and Apperson 1989).

They are native to the Spokane River above Spokane Falls and into Idaho's Coeur d'Alene and St. Joe drainages (Liknes and Graham 1988; Behnke 1992) as well as in the Salmon and Clearwater drainages of Idaho's Snake River system where they probably transferred from the Clark Fork drainage (Rieman and Apperson 1989; Behnke 1992). WCT are not known to be native to other major Snake River tributaries below Shoshone Falls (Behnke 1992). Disjunct populations presently occur or were once found in the mid-Columbia River basin in the Methow, Entiat, and Wenatchee river basins in Washington, and in the John Day River in Oregon (Id.).

CURRENT STATUS AND DISTRIBUTION

The available scientific data and literature on WCT distribution tell the story of the drastic decline of the subspecies throughout its range. This fish, caught by a member of the Lewis and Clark expedition in 1805 (Trotter 1987), was once abundant within its historic range. With few exceptions, surviving populations exist almost exclusively in isolated headwater areas and low order streams (Leary et al. 1990). This is probably due to the lack of incursion of exotic species in such small streams and diminished human environmental influence in more remote areas (Id.).

Throughout their current range, strong populations of WCT are closely associated with unmanaged areas and federal lands. The Integrated Scientific Assessment for Ecosystem Management in the Interior Columbia Basin (Quigley, et al. 1996) reports that 44% of WCT strongholds are located in wilderness areas and 94% of strongholds are on FS/BLM lands. The assessment does not include figures for nonwilderness roadless areas or National Park Service land, which would strengthen the association with undeveloped areas and reflect further the restriction of WCT to high-elevation, headwaters streams. Other studies have identified the same correlation (Liknes 1984; Liknes and Graham 1988; Marnell 1988; Rieman and Apperson 1989; Lee et al. 1996). At the same time, these studies do not suggest that habitat on federal lands is adequately protected: 65% of populations on FS/BLM lands are considered depressed (Quigley, et al. 1996).

Petitioners describe below the current status and distribution of WCT populations and habitat by state, major drainage, and federal management unit. The discussion includes a description of extant populations and factors presently or likely to affect those populations.

I. MONTANA (See Appendix D)

WCT in Montana occupy an estimated 19% of their historic range of 57,184 stream miles (Van Eimeren 1996). Populations are abundant in 2% of their historic range and would be considered viable (abundant and common) in 8% of their historic range.

Non-hybridized populations are substantially less common. Liknes and Graham (1988) estimated that genetically pure populations were present in about 2.5% of the historic range and 9% of the current range in Montana. Currently, about 33% of the 10,830 stream miles occupied by WCT have been electrophoretically sampled (Van Eimeren 1996). Of those tested, 59% are pure. This means that about 20% of the current populations are known to be pure. Another 13% are suspected to be pure without potential introgression, but remain untested. A much higher proportion of pure populations have been tested because biologists have emphasized testing of waters where pure populations are suspected (Id).

Similarly, only 8.3% of the 265 lakes in Montana believed to be occupied by WCT contain pure populations (Liknes and Graham 1988). Nineteen of these 22 genetically pure lacustrine populations are in Glacier National Park (Liknes and Graham 1988; Marnell 1988).

The situation is worse east of the Continental Divide, where WCT occupy about 7% of their historic range, with genetically pure populations in about 1% of historic range. Individual populations have recently become extinct (USFS/BLM 1996).

A recent update of the Montana Rivers Information System shows the cumulative % of total hydrography length occupied by WCT by genetic status: In the Upper Missouri, 100% pure WCT are abundant and common in 0.436% of total hydrography length, and are rare/incidental in 0.753%. In the Kootenai, pure WCT are abundant and common in 1.211% and are rare/incidental in 2.148%.(MRIS 1997, see Appendix U-9)

For the Clark Fork and Flathead drainages information is provided only as to the cumulative % of surveyed length occupied by WCT be genetic status: in the Clark Fork drainage, pure WCT are abundant and common in 14.605% of surveyed length and are rare/incidental in 6.446%. In the Flathead drainage, pure WCT are abundant and common in 11.218% of surveyed reaches and are rare/incidental in 5.172%. (Id.).

The above figures likely underestimate the severity of the decline in WCT populations (Behnke, pers. comm. 1996). Percent occupancy of historic range is based on stream miles**/hydrologic length**, and presently occupied streams are **often first through third** order **headwater** streams. Historically, WCT also occupied fourth to sixth order **mainstems and** rivers, where greater surface area and volume would have supported more habitat and higher fish densities per linear mile (Id.). The distribution and abundance of WCT is continuing to decline across the state (Van Eimeren 1996b).

A. UPPER MISSOURI RIVER BASIN (See Appendix E)

Historically, there were approximately 3600 streams that supported WCT populations in the Upper Missouri River Basin. By the late 1980s, this figure had dropped to approximately 80 streams. Individual populations recently have gone extinct (or are about to go extinct) in five streams. (USFS/BLM 1996a; Pacific Rivers Council 1995). Only four lakes east of the divide contain WCT populations (Liknes and Graham 1988). The few remaining pure WCT populations are threatened by domestic stock pollution, excess silt and turbidity, stock overuse, lack of bank vegetation, and lack of spawning habitat (MRIS). Many of these populations are limited to two kilometers or less distribution and only a few are distributed over even ten kilometers (Sanborn, pers. comm. 1995).

An assessment of the extinction risk for westslope cutthroat trout in the Upper Missouri Basin indicates, of the 144 remaining populations with genetic purity greater than 90%, 103 or 71% of the 144 populations have a very high risk of extinction or very low 'probability of persistence', 27 or 18% were assigned a high risk of extinction and 14 or 10% were assigned a moderate risk of extinction (USFS/BLM 1996b). There were no populations with a low risk of extinction.

The recent Technical Summary for WCT in the Upper Missouri River Basin, done by the USFS and BLM, shows that 100% genetically pure populations of WCT presently inhabit 545 miles (1.0% of historic range); 98-99.9% genetically pure populations inhabit 169 miles (0.3% of historic range); 90-97.9% genetically pure populations inhabit 333 miles (0.6% of historic range); <90% genetically pure (known hybridized) populations inhabit 328 miles (0.6% of historic range); and untested, but suspected, populations inhabit 2,611 miles (4.6% of total habitat miles within the basin of historic range). (USFS/BLM 1996c).

Review of fish survey data collected by Montana Fish, Wildlife and Parks (FWP), Forest Service (FS) and Bureau of Land Management (BLM) revealed that several populations have gone extinct within the past ten years and that almost all populations presently occupy isolated habitat fragments, many of which are very small (less than 5 miles in length). (Id.).

1. Elkhorn Wildlife Management Unit - Deerlodge and Helena National Forests

In the Elkhorns, brook trout predominate throughout the range that was originally occupied by native cutthroat trout (Elkhorn Forest Plan Amendment EA 1996). Rainbow and brown trout have occupied portions of some streams as well. Based on riparian disturbance surveys, general fishery surveys, and hydrology surveys, a number of streams are known to have fish habitat conditions substantially below desirable levels throughout the Elkhorn Mountains. These degraded conditions are due primarily to introduced non-native species, mining, livestock grazing, changes in habitat due to road construction, and beaver trapping (Id.).

Poor hydrologic conditions on some non-fishery stream reaches are having negative effects on downstream reaches which do support fish (Id.). In most cases, these negative effects involve elevated sediment delivery associated with bank trampling caused by both livestock and wildlife use (Id.).

The lakes in the Elkhorns have all been stocked with various trout species since the 1920s (Id.). Leslie Lake is currently stocked with cutthroat trout and is periodically restocked. Hidden Lake has supported a brook trout population for some time, which is probably self-sustaining. It was stocked with cutthroat trout in 1984 (Id.).

According to Elkhorn Forest Plan Amendment EA, the distribution of genetically pure resident stocks of cutthroat is limited to seven streams: Staubach, Dutchman, McClellan, Prickly Pear, South Fork of Warm Springs, Hall, and Muskrat Creeks (Id). Recent sampling efforts indicate that the population in the South Fork of Warm Springs Creek may have gone extinct. Numbers of westslope cutthroat present in other streams is low (Id.). Only the populations in Dutchman, Prickly Pear, and Hall Creeks are relatively secure from competition with brook trout as barriers on these streams prevent upstream migration of brook trout (Id.).

Len Walch, fisheries biologist for the Helena National Forest, presents slightly different information. According to Walch, the Prickly Pear population is hybridized and the McClellan population is possibly hybridized (Walch, pers. comm. 1996). The population in Crystal Creek is hybridized, while Teepee Creek contains pure WCT further up the drainage (Id.). The risk of extinction for the isolated cutthroat trout populations is high, and the overall extinction risk for cutthroat trout in the Elkhorn Mountains is presently high (Id.).

2. Big Belt Mountains (Helena National Forest)

Prior to impacts from miners and settlers, Big Belt Mountain tributaries and the mainstem Missouri and Smith Rivers were an interconnected system (Big Belts Integrated Resource Analysis Documentation 1994). Streams successfully carried runoff and sediment to the Missouri or Smith Rivers, and beaver dams and healthy riparian areas countered flooding and sediment transport (Id.). WCT were widespread in the main channels of the Smith and Missouri Rivers as well as in high gradient tributaries (Id.). "Trout abundance was probably greater than currently because their habitat had not been degraded [and] size was also probably greater because of lack of fishing pressure and use of tributaries by Missouri River trout" (Id.).

Today the Missouri and Smith Rivers, the major tributaries and their fisheries have been altered extensively by dams and other impacts. Irrigation diversions have blocked the link between the main rivers and tributaries (Id.). There is substantially less functioning riparian area and more sedimentation due to management activities. Placer mining has caused loss of surface water, exhumation of the stream and alluvial material, and erosion of riparian soils (Id.). Road construction, intensive livestock grazing, and placer mining have led to stream cutting and reduced bank and channel stability (Id.).

Currently, only three streams are known to contain pure WCT: Whites Gulch, French Creek, and North Fork of Gurnett Creek. In French Creek, livestock grazing has degraded streambanks and reduced riparian vegetation in the headwaters. In Whites Gulch, extensive placer mining and livestock grazing has led to lack of pool habitat and riparian vegetation, undercut banks, and poor spawning gravel. Placer piles contribute sediment to Whites Creek, a WCT fishery. A fish habitat survey completed in 1987 rated the stream very poor. A major restoration project has been initiated to rehabilitate the fish habitat in Whites Creek.

Most streams in the Big Belts contain rainbow, brook and/or hybridized cutthroat trouts. Lakes contain non-native fishes or are barren. There are some reaches where fish species are unknown, and others that had surface flow and fisheries in the past but currently are dry due to mining and irrigation (Id.).

3. Little Belt Mountains

(Lewis and Clark National Forest)

The Smokey-Corridor Timber Sales FEIS (1993) states that viable populations of WCT existed in four streams within the analysis area as recently as the 1970s, but are now absent from all but the North Fork of Deadman Creek. Brook trout outnumber WCT four to one in this creek (Id.). In the 1970s, WCT were documented in Jumping Creek, Wolsey Creek, and the upper reaches of Sheep Creek. Only brook trout are now present in these streams. A single juvenile cutthroat trout was found in the mainstem of Sheep Creek near the confluence with Mizpah Creek. It was once believed that the cutthroat trout in Lake Creek were genetically pure. However, that seems unlikely given the data collected in the last few years (Id.).

Fish habitat in certain areas of Sheep Creek has been affected by past road construction practices (Id.). In addition, dewatering at the Holstrom Ditch has negative effects on fishery values for a substantial distance below the diversion. Fish habitat components on reaches throughout the analysis area have been negatively impacted by past road construction and livestock grazing (Id.). Generally, the spawning gravels in streams throughout the project area are less than optimum. Current levels of fine sediments in spawning gravels range from 32-60%, and trout egg survival rates range from 3%-85%. The average level of fine sediment for all streams sampled was 42%, which results in egg survival rates less that 10%. The North Fork Deadman Creek is currently 35% above natural conditions for sedimentation, reflecting the combined effects of existing roads, timber harvest, livestock grazing, and natural erosion processes (Id.).

All WCT populations in the North Little Belts are at moderate or high risk of extinction due to habitat loss and non-native trout competition or hybridization. (North Little Belt Mountains Range Analysis 1997). ~~WCT are also present in Dry Wolf Creek in the project area of the Running Wolf Timber Sales, which will build roads and harvest 1,600 acres within the Tollgate-Sheep Roadless Area~~ **Dry Wolf Creek was stocked with unknown strains of cutthroat trout, rainbow trout and eastern brook trout. Eastern brook trout now dominate much of the drainage. (Id.). The Dry Wolf Creek WCT population is about 97% pure. This stream is in the area of the Running Wolf Timber Sale, which will build roads and harvest 1,600 acres within the Tollgate Sheep Roadless Area**(Running Wolf Timber Sales FEIS 1995). WCT populations already have declined in all drainages as a result of the introduction of non-native rainbow and brook trout and bank erosion and increased sedimentation from past mining, grazing, and road construction (Id.). Minimum streamflows and availability of pool habitat are likely to be the most important limiting factors on fish populations in the project area (Id.).

Running Wolf Creek was stocked many times with cutthroat (probably Yellowstone strain), rainbow and eastern brook trout.

Today, brook trout are very abundant in the National Forest portion of Running Wolf Creek - except in the upper reaches of the North Fork. 100% pure WCT still occupy this headwater section. (North Little Belt Mountains Range Analysis 1997). Cutthroat trout (probably Yellowstone), rainbow and brook trout were stocked in Yogo Creek. Today, rainbow and brook trout are common in the lower reaches of Yogo Creek. Brook trout are also present in Elk Creek and the lowermost portion of Skunk Creek. Upper Yogo Creek contains 92% pure WCT, and there is a 100% pure population in Elk Creek. (Id.). These streams are also in the Running Wolf Timber Sale project area.

Also in the North Little Belts, WCT populations in Snow and Placer Creeks are 100% pure. Lyon Gulch and Butcherknife Creek have abundant populations of brook trout and hybridized WCT populations (about 90% pure). (Little Belt Mountain Range Analysis 1997).

4. Gallatin and Madison Rivers (Gallatin National Forest)

Hybridization with Yellowstone cutthroat trout and rainbow trout has occurred throughout the drainage (Ireland 1993). Electrophoretic analysis indicates westslope cutthroat have remained more than 85% pure in Cache Creek, one of the highest purities remaining in the Gallatin River drainage (Liknes 1984; Ireland 1995). These populations are threatened by recent timber harvests and cattle grazing that have heavily impacted the area.

Density of WCT is positively associated with elevation, and WCT was the only species present above 2268 m (Ireland 1993). Higher densities were found in less embedded channel unit types with more stable banks.

The only secure population of pure WCT in the Gallatin National Forest is found in Cabin **Creek,a headwater stream of the Madison River** within the protected Cabin Creek Special Use area just north of the Lee Metcalf Wilderness Area.

Introduction of rainbow and brown trout has caused displacement or hybridization of WCT throughout the Madison River drainage. A small population of WCT persists in the upper reaches of Soap Creek, and hybridized populations may occur in Horse Creek and elsewhere (Henckel 1996). Until recently, WCT numbers in the mainstem Madison River near Soap Creek were four to six per mile, but populations may be rebounding somewhat following the decimation of rainbow trout by whirling disease (Id.).

5. Beaverhead National Forest

According to the Oil & Gas Leasing Draft Environmental Statement (1994), WCT historically occupied about 90% or more of the drainages in the Beaverhead National Forest. Currently they occupy 5%. Poor riparian conditions and hybridization are widespread. Inadequate habitat conditions, including lack of pools, spawning gravels, and overhead vegetation, has caused a decline in fish numbers and a shift in species from WCT to more adaptable, introduced fish. Livestock grazing occurs throughout most of the forest and has been a significant factor in altering stream channel morphology and fisheries habitat (Id.). Of 25 grazing allotments containing streams with genetically pure WCT, 4% (1) are in excellent condition, 28% (7) are in good condition, 32% (8) are in fair condition, and 36% (9) are in poor condition (Id.).

Mining also has significantly affected WCT populations in the forest. Placer mines dating from the late 1800s and early 1900s have had substantial adverse affects on fish habitat and population numbers (Id.). While new restrictions and riparian area reclamation may help reduce the immediate and long term effects of new mining, the impacts of the old mines have not been monitored and fisheries surveys show that they continue to affect fish numbers (Id.).

WCT were once widely distributed throughout the Boulder and Wyman Gulch Creek drainages, but present populations represent reduced distribution, and brook, brown, and rainbow trout are present throughout the area (Boulder and Wyman Gulch Vegetation Management DEIS 1996). WCT still occur in Boulder, South Boulder, Copper, and Wyman Gulch Creeks.

Instream habitat conditions in Wyman Gulch Creek have been affected by past timber harvest, roading, livestock grazing, and mining. Increased sediment delivery to the channel from a combination of past management activities and physical damage to the streambanks by livestock have resulted in high levels of instream sediment, poor quality pools, reduced streambank stability, lack of undercut banks, and high width/depth ratios. Road densities in the Wyman drainage are high, and recent testing indicates that current sediment yields are 134% of natural, without accounting for the affects of grazing. Roads have contributed the most to increased sediment delivery. Livestock grazing continues to degrade habitat (Id.).

Habitat in South Boulder Creek has been degraded by past road construction, mining, timber harvest, and livestock grazing. Conditions are relatively unimpacted in Copper Creek, but WCT are present only in low numbers and brook trout is the most abundant fish. WCT are most numerous in the high gradient reaches (Id.).

Fish populations in Boulder Creek drainage appear to be low. Boulder Creek drainage has been affected by mining-related water quality impacts. Low fish densities indicate historic mining activity is limiting fish populations. Non-native species dominate downstream reaches while WCT and bull trout are dominant in upstream reaches (Id.).

Timber harvest and road construction is also proposed in the Bender and Retie Creek area, in drainages that support marginally viable populations of WCT (Bender-Retie FEIS 1991).

WCT were likely found in most perennial streams and in some lakes in the Tobacco Root Mountains. (Tobacco Roots Landscape Analaysis, 1994). The influence of land use activities since settlement of the Tobacco Root Mountain area in the 1860s has drastically altered stream habitat and the distribution and abundance of fish populations. Land use activities such as placer mining, livestock grazing, timber harvesting, fire suppression, and the introduction of non-native fish species have contributed to the changes from the historic conditions of the

Tobacco Root streams. (Id.).

Placer mining has had the greatest effects on fisheries habitat in the Tobacco Roots. The major causes for elevated sediment levels are mining and road location. The distribution and abundance of WCT has also been affected by the introduction of non-native trout, including Yellowstone cutthroat trout, rainbow trout and eastern brook trout. The affects of introduced trout coupled with habitat alterations have resulted in the loss of the WCT from the Tobacco Root mountains. (Id.).

Of the perennial streams in the Tobacco Roots that have the potential to contain native WCT (about 50 streams), only 6% (3 streams) have them (see appendix U-1).

6. Deerlodge National Forest

According to Brian Sanborn, a fisheries biologist for the Deerlodge/Beaverhead National Forest, there are only two documented pure strains east of the Continental Divide on the Deerlodge National Forest and a couple of others close to pure. Several more populations are presently being tested, but researchers are having little success locating pure populations on the eastside (Sanborn, pers. comm. 1995).

There are significantly more pure WCT populations on the westside of the Deerlodge NF. This difference reflects the more extensive history of mining, water development --mostly related to mining --and introduction of non-native species on the eastside (Id.).

Of the two pure eastside populations, one is relatively strong in terms of abundance, and the majority of its habitat is of good quality because it is in an inaccessible canyon. However, there has been significant mining and grazing damage in the upper portion of the drainage. The other population is in extreme jeopardy because of limited linear distance of stream habitat and competition. A restoration project is underway to increase the existing range and remove brook trout (Id.).

7. Dillon Resource Area

According to Jim Roscoe, a fisheries biologist for the BLM, pure strains of WCT are limited, isolated, and vulnerable (J. Roscoe, BLM, pers. comm. 1995). Populations east of the Continental Divide are in worse condition than on the westside (Id.). There are between 10 and 15 pure populations and about the same number of 90% to 99.9% pure populations (Id.). Few of these populations are healthy. Grazing is the most significant threat, but logging and mining have also played a major role in degradation of habitat. Irrigation diversions have isolated pure populations in headwater areas (Id.). As a result, these populations are small and isolated, they could easily be decimated by catastrophic events (Id.).

Riparian habitat in the area is categorized as "functional at risk," meaning that riparian areas are below potential and either are dominated by non-native species or do not have enough native species (Id.). Water quality has been severely degraded by grazing. While most pure populations are isolated from other fish species, there are a number of streams where WCT are being out-competed by brook trout (Id.). A study conducted in 1981 and 1982, found WCT with brook trout in some streams. In recent surveys of the same sites, no WCT were found and only brook trout were present.

Recent surveys located more WCT streams, and ~~Rehabilitation efforts are occurring on one grazing allotment. Otherwise, no rehabilitation of habitat is taking place.~~ **rehabilitation measures have recently been initiated on a few grazing allotments and on private land. (Kampwerth pers. comm. 1997).**

According to Dave Kampwerth, fisheries biologist for the BLM, Dillon Resource Area, brook trout are the main reason for the disappearance of WCT from these streams. Habitat degradation is also a concern in that it plays a role in brook trout becoming dominant. Degraded habitat enables the brook trout to thrive, while diminishing the ability of the WCT to compete. However,

even under good habitat conditions brook trout would wipe out WCT.

Bear Creek, in Upper Horse Prairie, is located on BLM, USFS and private land. It contains 99% pure WCT. In 1993 WCT and brook trout were captured, with brook trout at a 6:1 ratio over WCT. In 1997, brook trout were the only fish captured on the forest. An aquatic habitat survey on private and BLM land in 1997 found generally good conditions with some over widening in areas. Brook trout were in the process of spawning, were numerous, widely distributed and easily identified. Only 2-3 WCT were seen during that survey in approximately 5 miles of stream. Brook trout may be the primary cause for declines in WCT abundance. There is a concern for hybridization due to a direct confluence to Trail Creek. (Kampwerth pers. comm. 1997).

Also in Upper Horse Prairie, the North and South Forks Everson Creek contain 100% pure WCT with brook trout. Brook trout are the only fish seen during surveys on Everson Creek. The pasture containing these creeks is in the middle of 10 years of rest from cattle grazing. Fence realignment and stream rehabilitation are proposed for 1998. Fish barriers and brook trout removal are proposed for 1999. Based on preliminary surveys in Shenon Creek, on BLM land, WCT are most likely extinct due to cumulative impacts of brook trout and habitat degradation. Brook trout are the primary reason for the extirpation of the WCT from this creek. (Id.).

The North and South Forks of Divide Creek in Horse Prairie contain 99% pure WCT. There are habitat concerns due to grazing, and there is an AMP revision proposed in the near future. (Id.). Frying Pan Creek and Trapper Creek both contain hybridized populations impacted by grazing. (Id.).

The East and West Forks of Dyce Creek, at the south end of the Pioneer Mountains, contains 100% pure WCT with brook trout. The stream, located on USFS, BLM and private land,was historically impacted by placer mining and currently has riparian vegetation concerns due to livestock. WCT aquatic habitat conditions are considered fair to good. Brook trout:WCT populations have gone from 4:1 to approximately 17:1. **There is a timber sale proposed in this drainage in the future. (Id.)**

A little farther south, Reservoir Creek flows through USFS, State, Private and BLM land.

It contains 100% pure WCT which are isolated and impacted by livestock and irrigation. (Id.).

Also at the south end of the Pioneers, Farlin Creek contains 100% pure WCT. It flows through USFS, BLM and private land. The Forest Service administers the allotment, and the recent Allotment Management Plan revision is not functioning well. Two years ago the population was approximately 50/50 WCT to brook trout. The portion of this creek that flows through BLM land is the best suitable fish habitat on BLM land. A fish barrier installation is proposed for the future. (Id.).

Farther North in the Pioneers, flowing into the Big Hole River, Cherry Creek contains a pure population of WCT, although brook trout are in the majority.

Jake Canyon Creek and Cottonwood Creek both flow into Blacktail Deer Creek. Jake Canyon Creek contains 100% pure WCT. Generally, the lower 2/3 of this creek is in good condition with the upper 1/3 in fair condition. Cottonwood Creek contains 98% pure WCT. Again, the lower 2/3 is in good condition and the upper 1/3 is in fair condition. There is a timber sale proposed on state lands on a tributary to Cottonwood Creek. Whirling disease has been detected in Blacktail Deer Creek. (MFWP 1997).

Spring Creek, on the west side of the Ruby Mountains, runs through BLM, State and private lands. It contains 100% pure WCT with brook trout present. There are livestock concerns, and an Allotment Management Plan revision is currently being conducted. (Kampwerth pers. comm. 1997). At the south end of the Ruby Range, Sage Creek has pure WCT and brook trout. This stream has been impacted by grazing, and there is concern as to channel recovery potential. There is concern about impacts related to future bison grazing. (Id.).

Also in the Ruby Mountains on BLM and state lands is the Left and Middle Forks Stone Creek which contain 100% pure WCT. This area is undergoing the same AMP revision as Spring Creek. Sediment impacts the Left Fork from an open pit mine and county road. The Middle Fork has approximately 120 beaver dams in four miles with habitat degradation and loss of spawning habitat due to sediment retention in, below and above the beaver ponds. Beaver ponds act as thermal “sinks”. The proposal for 1998 is completion of a riparian pasture in the Middle Fork and restoration of the beaver ponds to reduce sediment loads. (Id.).

In the Ruby River drainage, WCT in Idaho Creek are pure on Forest Service land, but 70% pure on BLM land. There is a natural debris jam acting as a barrier. Habitat concerns include mining and livestock impacts. The North and South Forks Greenhorn Creek are 97% pure and are outnumbered by brook trout.(Id.).

In the Gravelly Mountain Range, Rock Creek contains pure WCT. Livestock has caused bank damage, and two dams are significant sediment sources. There is a large number of WCT in this stream, and the reservoir acts as overwintering habitat.

In the Big Sheep Creek basin, Muddy Creek, a tributary, has pure WCT and high natural sediment levels. Brown trout have moved into this stream, and a fish barrier was recently constructed. Meadow Creek has livestock concerns, and future plans include a fence and watergap. Simpson Creek has pure WCT, but has historic livestock impacts to banks and vegetation and irrigation diversion concerns. Stream restoration activities will be examined in the future. This creek may be important for long term conservation. (Id.). Whirling Disease has been detected in rainbow trout in Big Sheep Creek. (MFWP 1997).

In the Madison River basin, Papoose Creek potentially has 100% pure WCT. The creek is in good-excellent condition on BLM land. Future plans include removal of non-natives if present and construction of a barrier to create a conservation fishery along with Buffalo, Arasta and Horse Creeks. (Kampwerth pers. comm. 1997). Whirling disease has been detected in rainbow trout in Papoose Creek. (MFWP 1997).

In the Medicine Lodge Range, Rape Creek has “a good amount” of pure WCT. (Kampwerth pers. comm. 1997). A small portion of the creek is heavily impacted by cattle. Fencing is planned in the next two years. An AMP revision was done recently, and the creek looks stable. Craver Creek also has pure WCT. This stream is going through rehabilitation, with fencing, road closures and the removal of brook trout. (Id.).

In the Centennial Valley, Bear, Bean and Jones Creeks have pure WCT. These populations are isolated, genetically diverse and are in good shape. The upper 2/3 of these streams is in great shape, while the lower 1/3 is in poor shape. Restoration activities such as beaver pond removal, fencing and water gaps are occurring on BLM and private land. The WCT population in Price Creek is 97% pure. (Id.).

In the Tobacco Root Mountains, Bivens Creek contains pure WCT with brook trout present. There is historic impacts from placer mining. Currently, there are livestock/riparian vegetation concerns. Harris Creek also contains pure WCT with brook trout present. Its condition is similar to that of Bivens Creek. The WCT populations in Ramshorn, Indian and Basin Creeks are 99% pure. The Ramshorn and Indian Creek are in good condition, although it is unknown whether brook trout are present. Basin Creek is primarily on private land. There are serious livestock concerns, including vegetation and bank stability (Id.).

B. CLARK FORK RIVER BASIN

Historically, the WCT was abundant throughout the entire drainage in Montana. Today, there is a high proportion of introgressed populations, which indicates that relatively few pure populations of WCT exist (Leary, et al. 1984). Blanchard Creek, the South fork of Lolo Creek, Stoney Creek, and Tin Cup Creek contain WCT X rainbow trout hybrids, while Granite Creek and O'Keefe Creek contain pure native westslope cutthroat trout (Id.). Mill Creek also contains an introgressed population (Allendorf and Phelps 1981; Leary, et al. 1984).   According to Behnke (1992), introductions of brown, brook, and rainbow trout, along with changes in flow and water quality, are responsible for the demise of westslope cutthroat trout in this drainage.

In the Upper Clark Fork, pure populations can be found in some tributaries. These are mostly in roadless areas, some of which are currently threatened by logging and road-building. Non-native species are common throughout the drainage, which has been extremely degraded. The Montana Rivers Information System (MRIS) gives an extensive list of limiting factors in this drainage, including channel/bank alteration by agriculture, chronic dewatering, domestic stock pollution, excessive siltation and turbidity, stock overuse, introduction of non-native fish, and mining-related pollution. Mining and road construction have degraded the watershed, bedload movement and low or high summer temperatures limit fish production, urban development and roads have altered the channel/banks, and anglers have overharvested the WCT. Management recommendations include decreasing

man-caused flow fluctuations, changing angling regulations, and initiating watershed restoration (MRIS).

There are fewer populations found in the Middle Clark Fork. Pure WCT are found in the South Fork of Little Joe Creek, despite extensive damage from sedimentation and roads. Many other rivers and important spawning tributaries of pure populations are seriously degraded by logging and roads, including Ward Creek and the St. Regis River. Timber harvests have been heavy throughout the drainage and large timber sales are planned for all roadless areas.

The Milltown Dam, the nation's largest Superfund site, and a Montana Power dam have blocked spawning migrations, and the mine in Butte has caused extensive damage throughout the drainage from toxic mine tailings. Fish kills often occur after heavy rains.

According to a recent study of WCT and bull trout in the Clark Fork River basin, fragmentation by mainstem impoundments increases the risk of extinction for WCT in the lower Clark Fork River basin by reducing the effective populations size. Cabinet Gorge and Noxon Rapid impoundments contribute to, but are not solely responsible for, the fragmentation of native fish populations in the lower Clark Fork River. Other impoundments also fragment the watershed. Thompson Falls HED, constructed in 1913, creates the upstream boundary of the Noxon Rapids segment of the watershed. The federal Albeni Falls project, constructed in 1952, creates the downstream boundary for the fish using Pend Oreille Lake and tributaries. Chronic and catastrophic habitat damage in nursery streams contributes to fragmentation of the Pend Oreille, Cabinet and Noxon populations. (Pratt and Poff 1996).

Changes in tributary habitats has further reduced effective populations size, increasing the risk of extinction for the three cutthroat trout populations.. "Even if effective improvements occur in mainstem and tributary habitats, conflicts with introduced species may prevent recolonization of restored habitats." Introduced species such as brook trout, brown trout and rainbow trout now inhabit much of the basin. (Id.).

1. Cabinet Gorge Reservoir and Tributaries:

Both resident and migratory cutthroat trout persist in the area, and the tributaries support some [WCT] populations. (Pratt and Poff 1996). Oral histories indicate cutthroat used Bull river, Blue Creek, Elk Creek, Pilgrim Creek, and Rock Creek. The tributaries to Cabinet Gorge are generally in a degraded condition, and many tributaries are intermittent due to bedload aggradations. (Id.).

The habitat conditions in Cabinet Gorge Reservoir do not appear to favor westslope cutthroat trout due to warm water. The exception may be Bull River Bay, where, in some years, the water is 3 degrees Centigrade cooler than the reservoir. "The reservoir population is small, and sampling collects few cutthroat trout each year. Sampling collected eleven and three cutthroat trout during 1993 and 1994 respectively in Cabinet Gorge Reservoir." (Id.). Water temperatures probably confine cutthroat trout distribution in the reservoir. (Id.). "Food availability may influence the distribution of cutthroat trout also. Rapid flushing of the reservoir means there is no zooplankton for cutthroat trout to eat**." (Id.)**

2. Noxon Rapid Reservoir and Tributaries

The Pratt and Poff (1996) study states that oral histories show that cutthroat trout once used almost all the tributaries in the Noxon reach including: McKay Creek, Stevens Creek, Swamp Creek, Marten Creek, Trout Creek, Vermillion River, Big Beaver Creek, Deep Creek, Graves Creek, Squaw Creek, Mosquito Creek, and Prospect Creek. Oral histories did not show cutthroat in Tuscor Creek. (Id.). Today, many of Noxon's tributaries have intermittent flows, due to bedload aggradations. "Oral histories show that this intermittency is relatively new, developing within the lifetime of the interviewed parties. This phenomenon is common in the lower Clark Fork; all tributaries to Noxon, except Vermillion River, are intermittent. The agradations occur in watersheds that are no longer in hydrologic equilibrium. Channel damage happens in 3rd, and 4th order streams. Habitat restoration will take a long time. Despite the difficulty of habitat restoration, it is an absolute requirement if we expect...[WCT] to persist in the Noxon Rapids area." (Pratt and Poff 1996).

The study found both resident and migratory individuals appear to

persist in the area, and the tributaries support some WCT populations. However, while WCT were once ubiquitous and abundant in the tributaries to the Noxon Rapids area, populations appeared to decline during the early years of reservoir operation. Substantial stocking programs in reservoir and tributary habitats with mixed subspecies, and later pure strain WCT, did not restore or establish abundant cutthroat trout population. Based on netting series, the reservoir population today is small. (Id.).

Due to warm temperatures, the habitat conditions in Noxon Reservoir do not appear to favor WCT. The exception may be Vermillion River Bay, which tends to be 3C cooler than the reservoir, in some years. Water temperatures probably confine cutthroat trout distribution in the reservoir. (Id).

Similar to Cabinet Gorge Reservoir, food availability may influence the distribution of cutthroat trout. Rapid flushing of the reservoir means there is no zooplankton for cutthroat trout to eat. Instead, WCT feed on aquatic insect and terrestrial insects blown onto the reservoir, for which there is a great deal of competition in the reservoir, particularly from introduced species. (Id.).

3. Lower Clark Fork River Basin See Appendix U-2

The Washington Water Power Company conducted extensive surveys of WCT in the Lower Clark Fork River(LCFR) basin. While the study provides information on current WCT populations in the LCFR, it does not discuss how current populations compare with historic occupation of the basin, the connectivity of the populations, the land management activities affecting water quality and habitat, nor the predicted future trend for WCT populations and habitat conditions. The following are the results of the surveys:

Spawning habitat for salmonids in the Lower Clark Fork River tributaries is partially limited by low occurrence and patchy distribution of suitable spawning gravel. In many stream reaches fine sediment is often present in fairly high amounts. However, in most of the identified spawning areas predicted embryo survival to emergence for WCT and bull trout still fall within an

acceptable range (11 to 40 % for WCT) (WWPC 1996a).

Suitable rearing habitat for juvenile salmonids in the LCFR tributaries is limited by a lack of adequate winter flows, and a lack of cover and velocity refuge features including stable, unembedded cobble and boulder substrate, LWD [large woody debris], undercut banks, and side channel areas. (Id.).

WCT are the only trout species native to the Clark Fork drainage and are widely distributed throughout the tributary system of the LCFR. Overall, cutthroat trout (pure WCT and hybrids) are the most abundant trout species in the surveyed sections of the LCFR tributaries. Densities are highest in mid-reach portions of the tributaries that have a fairly stable channel and larger substrate, contain high amounts of LWD, spawning habitat, rearing habitat, have moderate water temperature regimes, and low levels of fine sediment deposition and competition from other species. Populations consist primarily of resident fish, although there is a small adfluvial component. The WCT population estimate for the entire LCFR basin is 69,543 (Id).

Genetic evaluations show cutthroat populations in the LCFR tributaries are dominated by pure strain, native WCT, although there is evidence of hatchery origin WCT, Yellowstone cutthroat, and rainbow trout genetics in a few populations. (Id.).

Brook trout is the second most abundant trout species in the basin, currently occupying 96% of the drainage. They compete with WCT for rearing, foraging, resting and concealment habitat. The population estimate for brook trout in the basin is 35,625. Brown trout are also present, inhabiting 75% of the drainage. The population estimate for brown trout in the basin is 8,520. (Id.).

In the LCFR tributaries, WCT densities average 0.484 fish/m of stream, ranging from 0.014 fish/m in the West Fork of Elk Creek to 1.269 fish/m in Pilgrim Creek. (Id.). They frequently attain age III+, although few appear to reach age IV+ and very few age V+. Longevity is relatively low compared with other systems. Brook trout densities average 0.293 fish/m of stream, ranging from 0.002 fish/m to 1.323 fish/m of stream. (Id.).

Results from 1992-1994 samples show pure WCT dominate the samples and are scattered throughout the LCFR tributaries. Twenty of the twenty-eight samples appear to be pure, two samples had 2% or less foreign genes and are considered pure for management purposes. Six samples were classified as hybridized stock, with either Yellowstone cutthroat trout and rainbow trout.

While the study provides predicted embryo survival to emergence rates for WCT ad bull trout, it does not provide this information for brook, brown or rainbow trout.

In the Bull River, WCT are found throughout the mainstem and are the most abundant trout species in all the surveyed reaches. Densities average 0.421 fish/m of stream, ranging from 0.147 fish/m to 0.597 fish/m. In the mainstem of Bull River, predicted embryo survival to emergence for cutthroat trout is 19%, ranging from 10 to 32 percent. Brook trout are the second most abundant trout species found throughout the Bull River mainstem. Brook trout densities average 0.180 fish/m of stream, ranging from 0.072 to 0.306 fish/m of stream. Electrophoretic analysis showed pure WCT in Berray Creek, Dry Creek, Napoleon Gulch, Hamilton Gulch, and Star Gulch. Copper Creek showed evidence of hybridization. Due to the small sample size in Dry Creek and Napoleon Gulch, the possibility exists that the populations may contain rainbow or Yellowstone cutthroat hybridization that went undetected. Therefore, these populations could be slightly hybridized. WCT predicted embryo survival in the Bull River mainstem is 19%, ranging from 10-32%. This is relatively low compared with the LCFR tributary average. (Id.).

WCT are present throughout the East Fork Bull River, and are the most abundant trout in two reaches, but the least abundant in one reach, where brown trout are the most abundant. Predicted embryo survival to emergence averages 39%, ranging from 28% to 51 percent. This is based on fine sediment levels in spawning substrate, which is lower than the average for the LCFR tributaries. Compared with the average for the LCFR tributaries, fish densities are relatively high for cutthroat. Fish densities average 0.614 fish/m of stream, and range from 0.020 fish/m to 1.223 fish/m. Brown trout densities average 0.211 fish/m of stream and range from 0.179 to 0.491 fish/m of stream. Genetic analysis shows that the WCT found in the East Fork Bull River are pure, but may have been influenced by hatchery reared fish. Currently, there are no physical barriers that would prevent upstream movement of cutthroat or rainbow trout that could

hybridize this population.

In the North Fork of Bull River, WCT densities are relatively high compared with averages for the LCFR tributaries. Brook trout are present in low numbers. WCT densities average 0.667 fish/m of stream, ranging from 0.277 fish/m to 1.239 fish/m. The population is slightly hybridized with Yellowstone cutthroat, but is considered to be pure for management purposes. Yellowstone cutthroat were stocked into the Bull River drainage and the North Fork in the 1940's and 50's. There are an estimated 3,404 WCT and 105 brook trout in the North Fork. Brook trout densities average 0.021 fish/m of stream.

In the South Fork Bull River, predicted embryo survival to emergence for WCT averages 27%, ranging from 26% to 31% - this is relatively moderate compared to the LCFR tributary average for all trout. WCT densities are relatively high compared with the averages for the LCFR tributaries. They are abundant throughout the South Fork Bull River. Densities average 0.929 fish/m of stream, ranging from 0.789 fish/m to 0.970 fish/m. It is possible that there is hybridization with YCT, but these fish are considered pure for management purposes. Brook trout are the second most abundant species in the S. Fork of Bull River. Brook trout densities average 0.244 fish/m of stream, ranging from 0.026 to 0.403 fish/m of stream. (Id.).

In the Middle Fork of Bull River, WCT and brook trout densities are relatively moderate compared with the averages for the LCFR tributaries. WCT densities average 0.535 fish/m of stream, ranging from 0.229 fish/m to 0.920 fish/m. They are the second most abundant species in one reach (brook trout are the most abundant), and the only species present in another reach. The population in this stream is considered pure. Brook trout densities average 0.301 fish/m of stream and is 0.504 fish/m in the one reach where they are the most abundant. There is a barrier to upstream migration of non-natives. (Id.).

Predicted WCT embryo survival to emergence in East Fork Blue Creek was 26%. Compared with the averages for the LCFR drainage, WCT densities were relatively high, and they were the only salmonid species found. WCT densities average 0.741 fish/m of stream, ranging from 0.994 fish/m to 0.48 fish/m. Electrophoretic data from samples taken from the East and West

Forks of Blue creek indicate that both these populations are pure WCT. However, there are no barriers to upstream movement of fish and potential sources of hybridization. (Id.).

In Elk Creek, predicted embryo survival to emergence for WCT was 35%, ranging from 11 % to 39%. Compared with averages for the LCFR drainage, fish densities were low for WCT, high for brown trout, and moderate for brook trout. WCT are present throughout Elk Creek, although they were the least abundant species in two reaches. Densities average 0.094 fish/m of stream, ranging from 0.007 fish/m to 0.146 fish/m. (Id.).

In the East Fork Elk Creek, predicted embryo survival to emergence for WCT was 36%. Fish densities for WCT were relatively low for WCT compared with the averages for the LCFR drainage. Brook trout densities were relatively high. While WCT were present throughout the East Fork, they were much less abundant than brook trout. When compared with the average for the LCFR drainage, the amount of salmonid spawning habitat per meter of stream was relatively low. There are an estimated 2,205 brook trout, 1,903 brown trout and 685 WCT. Brown trout densities average 0.262 fish/m, ranging from 0.189 to 0.387 fish/m of stream. Brook trout are the most abundant species, with densities averaging 0.304 fish/m, and ranging from 0.088 to 0.403 fish/m of stream. (Id.).

In the West Fork of Elk Creek, predicted embryo survival to emergence of WCT was 11%. The amount of salmonid spawning and rearing habitat per meter of stream was relatively low when compared with the average for the LCFR drainage. Electrophoretic analysis of cutthroat trout taken from the mouth of Pilgrim Creek and from the West Fork of Pilgrim Creek in 1994 indicate that the fish from the mouth of Pilgrim Creek are WCTXrainbow trout hybrids, and that the West Fork population is pure. There are no barriers to upstream movement of fish in Pilgrim Creek. Brook trout are also found in Pilgrim Creek. In the West Fork there are an estimated 47 WCT and 4,274 brook trout. (Id.).

WCT are present throughout Swamp Creek, although they are the least abundant trout in two reaches. Where WCT were the least abundant trout, Brook trout were the most abundant. Compared

with LCFR drainage averages, fish densities were low for WCT and high for brook trout. Brook trout densities average 0.726 fish/m of stream, ranging from 0.603 to 0.849 fish/m. Brown trout are also found in this drainage. WCT densities average 0.287 fish/m of stream, ranging from 0.104 fish/m to 0.47 fish/m. Salmonid populations are limited by stream intermittency, low amounts of LWD and suitable spawning and rearing habitat. Stream sections with year-around flows, unsedimented spawning gravels, suitable amounts of LWD, and unembedded cobble substrate had higher fish densities than sections without these components. Spawning and rearing habitat per meter of stream was relatively low when compared to the LCFR average. (Id.).

In the Swamp Creek drainage, samples of WCT were obtained from Wanless Land and three Cirque Lakes in 1987, from Swam Creek near Fox Land Road in 1986 and at the wilderness boundary during 1994. Results indicate that Cirque Lakes 1 and 2 contain pure WCT that may have been influenced by hatchery fish. Lake 3 fish are hybridized WCTxYCT as well as pure WCT. Wanless Lake fish are hybridized WCTxYCT. In Swamp Creek at the wilderness boundary, fish are hybridized WCTxYCT. AT the Fox Lane Road site, WCT are pure, but may have been influenced by hatchery fish. Downstream movement of hybridized fish from the Cirque Lakes and Wanless Lake, located at the drainage headwaters, most likely cannot be prevented. (Id.).

WCT are the most abundant species in two reaches of Marten Creek, and the second most abundant species in one reach, where brown trout are the most abundant species. Salmonid populations are limited by a combination of stream intermittency, migration barriers, low amounts of LWD and suitable spawning and rearing habitat. WCT densities average 0.520 fish/m of stream ranging from 0.048 to 0.900 fish/m. Brown trout densities in this reach were 0.477 fish/m of stream. Densities were high for brown trout, low for brook trout, and moderate for WCT compared with the LCFR drainage averages. Predicted embryo survival to emergence for WCT is 28%, ranging from 18 to 33 percent Electrophoretic analysis shows the WCT in Marten Creek to be pure, and may have originated from the Sate of Montana's brood stock. WCT obtained from the upper reaches of the South Fork Marten Creek in 1993 are considered pure.

WCT densities are relatively high compared with LCFR drainage averages in the North Branch Marten Creek Predicted embryo survival to emergence for WCT is 27%. This is moderate compared to the LCFR drainage average.

WCT densities in the South Branch Marten Creek was relatively high compared with LCFR drainage averages. However, the relatively low amount of suitable spawning habitat may restrict the population. Predicted embryo survival to emergence for WCT is 41%, which is relatively high compared to the LCFR drainage average. WCT densities are 1.160 fish/m. (Id.).

WCT are present throughout the surveyed section of Graves Creek, and are the most abundant species in two reaches, with bull trout the most abundant in the third reach. Fish densities were relatively high for WCT and bull trout and relatively low for brook and brown trout. WCT densities average 1.046 fish/m of stream, ranging from 0.667 to 1.381 fish/m. Predicted embryo survival to emergence for WCT was 39%, ranging from 28% to 33%. Brook trout densities were 0.006 fish/m. Spawning and rearing habitat per meter of stream is relatively high compared to the LCFR drainage averages. (Id.).

In the Vermilion River, flow conditions prevented accurate snorkeling or electrofish data on fish abundance. However, WCT, bull trout, brook and brown trout were all fond in the tributary section. Predicted embryo survival to emergence for WCT was 36%, ranging from 29 to 30 percent. This is relatively high compared to the LCFR drainage average. Cutthroat trout sampled in the Vermilion River above Vermilion Falls in 1983 are classified as pure WCT that could have been part of the State of Montana's brood stock. Samples were also taken from two tributaries below the falls, Cataract Creek in 1985-87, and Canyon Creek in 1991. Fish in Cataract Creek are WCTxYCT hybrids. Fish in Canyon Creek were pure WCT and WCT x rainbow hybrids. This population is pure for management purposes. With the exception of Vermilion Falls, there are no barriers to upstream movement of fish and possible sources of hybridization in the lower reaches of this drainage. Spawning and rearing habitat per meter of stream in the Vermillion River were relatively low compared with the LCFR average. (Id.).

In the Prospect Creek drainage, WCT samples were obtained from the West Fork of Dry Creek and Cooper Creek in 1987 and from Evans Gulch, Blossum Creek, and the mainstem of Prospect Creek in the vicinity of Twenty-three Mile Creek in 1994. Electrophoretic analysis indicates that all populations contain pure WCT. The sample from Blossum Creek, a headwater stream within the Prospect

Creek drainage, contained 21 pure WCT and one pure rainbow trout. The likely source of the rainbow is from lower Blossum Lake, which was stocked with rainbow trout in 1988 and 1990. If hybridization has not already occurred, the presence of these fish will most certainly lead to future hybridization not only in Blossum Creek but throughout the Prospect Creek drainage. Although no sampling was done in Prospect Creek, the presence of large numbers of rainbow trout indicate that the cutthroat population is undoubtedly hybridized. Brook, brown and bull trout were also present.

Electrophoretic analysis of samples taken from Crow Creek in 1987 indicate that this population is pure WCT. However, there are no barriers to upstream movement of fish and possible sources of hybridization in this stream. The presence of rainbow trout in the headwaters of the Prospect Creek drainage places this WCT population at risk of hybridization. Survival for WCT was 31% which is moderate compared to the LCFR average. Fish densities are relatively moderate for WCT and low for bull trout. There are an estimated 988 WCT and 74 bull trout. (Id.).

~~1.~~ **4.** Rock Creek

The West Fork of Rock Creek contains essential spawning habitat for WCT, but has been degraded by extensive logging and roads. Excess sedimentation limits fish production (MRIS). A few pure populations are found in small tributaries, including Douglas Creek, but the Lolo and Deerlodge National Forests have planned 22 timber sales and about 70 miles of new roads into roadless headwater areas in this drainage.

Fairman et al. (1995) concluded that hybrid cutthroat and brook trout limit the distribution of pure strain westslope cutthroat trout in Rock Creek. Small numbers of hybrid cutthroat are broadly distributed within the Rock Creek watershed. Pure strain westslope cutthroat trout use a relatively small part of the Rock Creek watershed, but are abundant in those areas. Pure WCT are found in Orr Creek and a segment of the East Fork Rock Creek. ***"Fairman et al.'s (1995) description of cutthroat trout in Rock Creek is likely typical of the situations we might find in the tributaries."*** **(Pratt and Poff 1996).**

In the Rock Creek drainage, samples of cutthroat trout were obtained from Rock Lake in 1987 and 1993; the upper reach of the East Fork of Rock Creek in the Rock Creek Meadows during 1987; and the East Fork of Rock Creek and mainstem Rock Creek in the vicinity of Engle Creek in 1986. Tests reveal that the Rock Lake population is hybridized WCTXYCT. The population in the Rock Creek Meadows area contains a mix of pure WCT, WCTXYCT hybrids and WCTXrainbow hybrids. The East Fork and mainstem Rock Creek populations are genetically pure. (WWPC November 1996c.).

Hybridization is most likely the result of stocking activities in Rock Lake or the meadows, which are located at the drainage headwaters. There are barriers to fish movement in Rock Creek Meadows and the outlet of Rock Lake further upstream. However, downstream movement of hybridized fish into areas of pure WCT is possible. (Id.)

Predicted embryo survival to emergence for WCT in Rock Creek was 15%, which is relatively low compared to the LCFR drainage average. WCT densities are relatively high in Rock Creek compared with the LCFR drainage averages, and brook trout densities were relatively low.. However, the amount of spawning habitat per meter of stream is relatively low compared with the average for the LCFR drainage. The average WCT density is 0.774 fish/m, ranging from 0.675 fish/m to 0.820 fish/m. Brook trout densities average 0.076 fish/m. In general, trout populations in Rock Creek are limited by stream intermittency and low amounts of suitable spawning and rearing habitat. Stream sections with unsedimented spawning gravels and unembedded cobble substrate had higher fish densities than stream sections without these components. Brook trout are the second most abundant trout species in two reaches of Rock Creek. (Id.)

WCT are present throughout the West Fork of Rock Creek stream system. Bull trout are the most abundant species. WCT predicted embryo survival to emergence for WCT averages 36%, ranging from 35 to 40 percent. This is relatively high when compared to the LCFR average. Fish densities are relatively low for WCT compared with the LCFR average. Densities average 0.209 fish/m of stream, ranging from 0.209 fish/m to 0.237 fish/m. Salmonid populations are limited by stream intermittency and low amounts of suitable spawning and rearing habitat. Stream sections that maintained year-around flows and contained unsedimented spawning gravels and

unembedded cobble substrate had higher fish densities than stream sections without these components. (Id.).

~~2.~~ **5.** Blackfoot River

Historically, WCT likely was a common widely distributed salmonid in all of the tributary streams within the Blackfoot River drainage (Beaver-Dry Timber Sale Supplemental FEIS 1994). Presently, populations are declining and threatened by introduced non-native species and WCT X rainbow hybrids. The entire drainage has been extensively damaged by mining and toxic metals, roadbuilding and clearcutting, cattle grazing, loss of riparian vegetation, and recreation. American Rivers, a private conservation organization, identified the Blackfoot River as one of the ten most endangered rivers in North America. In 1975, the Mike Horse Mine tailings pond suffered a major breach, leaking toxic metals throughout the river (Id.).

Recently, the governor's bull trout restoration team added its concerns to those of state wildlife officials about threats in the Blackfoot River from the proposed McDonald gold mine (Bozeman Chronicle, Wednesday, June 5, 1996, p. 5). Of special concern are "the large cyanide heap leach pads associated with this massive project coupled with a history at gold processing facilities of cyanide losses and increased ambient levels of other contaminants such as nitrates and sulfuric acid" (Id.).

WCT abundance is currently very low below the town of Lincoln (Beaver-Dry Timber Sale Supplemental FEIS 1994).

WCT in the mainstem Blackfoot River would have co-existed with both bull trout and mountain whitefish in the Helena National Forest portion of the Blackfoot drainage (Id.). Currently, they are still present in many streams in the Blackfoot drainage on the Helena National Forest. Recent work by Peters (1989) shows WCT abundance is down substantially in the mainstem Blackfoot compared to the early 1970s.

The Helena National Forest initiated an inventory to determine if there are any pure WCT in the upper Blackfoot drainage. So far, the cutthroat tested in over 20 tributaries to the Blackfoot River upstream of the confluence with Nevada Creek are genetically pure. Hybridization has only been found in the Nevada Creek drainage. Many of the genetically pure populations in the Blackfoot drainage, have an extinction risk of extreme (Wilson Cr., Moose Cr., Little Moose Cr., Sauerkraut Cr., E. Fk. Willow, W. Fk. Willow) or high ~~risk of extinction~~ (Washington Cr., Sheldon Cr., Buffalo Gulch, Wasson Cr., Dry Cr., N. Fk. Arrastra Cr., Stonewall Cr., Park Cr., Liverpool Cr., S. Fk. Poorman, Tom's Gulch, Pass Cr., Sandbar Cr., Beartrap Cr.) (Helena National Forest Oil and Gas FEIS, Biological Assessment 1995).

WCT abundance in the lower reaches of many Blackfoot River tributaries is reduced due to habitat degradation, dewatering, and competition with introduced species. These factors likely restrict significant migration of WCT from upper tributary reaches to the mainstem Blackfoot River.

Brown trout dominate the lower reaches of Beaver, Arrastra, and Rock Creek drainages. Cutthroat trout begin to increase in abundance farther upstream and are the dominant species present on the Helena National Forest. Brook trout also increase in abundance as one moves upstream toward the forest. Within the forest, brook trout are usually present in lower abundance than cutthroat, except on certain low gradient reaches of Beaver Creek where beaver have influenced stream morphology in the past (Beaver-Dry FEIS 1994).

The Nevada Mountain and Crater Mountain Roadless Areas are currently being logged on the Lincoln Ranger District in the Helena National Forest. The project involves logging 618 acres, building 3.4 miles of new roads and reconstructing 5.6 miles of existing road (Beaver-Dry Timber Sale FEIS 1994). Other ongoing activities within the project area, including placer mining in Lincoln Gulch, timber harvesting, and increased snowmobile usage, have the potential to contribute sediments and other contaminants (Id.).

~~The Helena National Forest also recently proposed logging in Poorman Creek and Humbug Creek, two roadless drainages which contain populations of pure WCT (Poorman Project Scoping Statement 1996). The project will clearcut 1,450 acres of forest, thin 600 acres, burn over 5,500 acres, and construct 16~~

~~miles of new roads and two miles of temporary roads (Id.). A Draft EIS is being developed by the Helena National Forest.~~

The Poorman Project proposes to harvest 14 million board feet of timber from approximately 2700 acres of forest land and underburn on 5,405 acres. (Poorman Project DEIS 1997). The project requires 14 miles of new system road and 2 miles of temporary road. This project also affects the Nevada Mountain and Crater Mountain Inventoried Roadless Areas.

According to some genetic analysis of cutthroat trout from the Poorman drainage done by Behnke in 1976, there was some hybrid influence in the cutthroat trout population (Id.). More recent samples collected from the Poorman Creek drainage were confirmed as pure WCT. However, only 10 fish were analyzed, and there is still the possibility that the Poorman Creek cutthroat trout could be hybridized with rainbow trout as indicated by the previous genetic analysis. Currently, brook, brown, cutthroat and bull trout are present within the Poorman Creek drainage. (Id.).

Only WCT have been found in Humbug and the South Fork of Humbug Creeks, and abundance levels were good. These streams do not connect to the Blackfoot River, and it is unknown whether other fish species are present on private land. Genetic analysis has not been completed for these populations.

WCT were found in high abundance in the lower reach of Poorman Creek near the Forest boundary in 1972 and 1973, representing 83% and 63% of fish captured in those years, respectively. 1990 data indicated that cutthroat were still present in high numbers, again at 83%. Evaluations in 1993 and 1996 found cutthroat representation of 40% and 71% respectively. State evaluations in 1989 and Forest Service evaluations in 1996 documented the WCT proportion of the salmonid population at 65% in the upstream reach of Poorman Creek while the Forest Service 1993 evaluations documented abundance at 38%.

Poorman Creek from the headwaters to its confluence with the Blackfoot River is listed as a “Water Quality Limited Segment” and in need of Total Maximum Daily Load development. Impaired

use includes aquatic life support and cold water fishery (partially supporting), and drinking water supply (threatened). The probable causes of impairment include siltation and metals. The probable sources of impairment include natural conditions, resource extraction, agriculture, dredge mining, road construction/maintenance, irrigated crop production, and streambank modification/destabilization.

The risk of extinction of WCT in the Poorman Analysis Area is rated as low based on factors detailed in Rieman and McIntyre (1994). However, these factors do not consider competing species in defining risk of extinction. Brook trout are abundant throughout much of the drainage, and brown trout is in the lower reaches of Poorman Creek. The DEIS recognizes that the persistence of WCT in some streams is jeopardized by the presence of brook and brown trout. (Id.)

Other foreseeable actions within the Blackfoot River drainage include the potential development of the Big Blackfoot Mine, small mining exploration in McCarthy Gulch, small placer mining on national forest lands in Washington Gulch, a large mining operation on private land in Washington Gulch, and a placer operation on private land in Sauerkraut Creek, where there are potentially pure WCT populations (Beaver-Dry Timber Sale Supplemental FEIS 1994).

Another timber harvest project in the Helena National Forest is the Jericho Salvage Sale. The Forest Service is proposing salvage treatments and temporary road construction on the 1,380 acre Jericho Salvage Project Area on the Helena Ranger District. (Jericho EA 1996, Jericho FEIS 1997). The proposed action would salvage 1 million board feet from 179 acres of National Forest Land and construct two miles of temporary road. The entire project is located within the Jericho Mountain Roadless Area. WCT are found in Sally Ann, Bryan, Telegraph, and Jericho Creeks. Brook trout are also found in each of these creeks. The project is located within a priority watershed, as designated by the Interim Inland Native Fish Strategy. (Id.) However, the RHCA widths were modified from 300, 150, and 100 feet on the fishery, non-fishery perennial and intermittent tributaries to Sally Ann Creek, to one site potential tree height (about 90 feet). (Jericho FEIS 1997).

According to the Environmental Analysis, the direct and indirect effects associated with this project are mainly due to temporary road construction, short term maintenance of temporary road, obliteration activities, and the three associated culvert crossings. (Jericho Salvage Sale EA 1996). Data from a 1991 sediment analysis reveals that Sally Ann Creek had 43.1% fines (<6.4mm) within its spawning substrate. (Id.). This sediment level is viewed as being at its upper range of natural variation. Estimated egg survival to emergence for westslope cutthroat trout and brook trout was 11.6% and 44.7%, respectively. The EA acknowledges that any increase of sediment over existing levels would reduce the egg survival for both species. In addition, the EA recognizes that it is generally accepted by fisheries personnel that brook trout tolerate fine sediment better that WCT, therefore, any increase in sediment would be more detrimental to the WCT population than the brook trout. (Id.)

A 1991 sediment analysis of Jericho Creek revealed that it had 39.8% fines (6.4mm) within its spawning gravels. Estimated survival emergence for cutthroat is 15.5% and 49.3% for brook trout. The fish population is 50% WCT and 50% brook trout. Any sediment increase above these levels would cause a decrease in emergence rates, which would be more severe to the WCT population than the brook trout. (Id.).

Due to high sedimentation, spawning gravels within Telegraph Creek are somewhat limited, and WCT are believed to heavily rely upon the tributaries for spawning opportunities. Telegraph Creek is a water quality limited segment (WQLS) as listed in the state of Montana’s Section 305(b) report under the Clean Water Act. According to the report this drainage only partially supports the required beneficial uses. Probable sources of impairment include resource extraction, pasture land, silviculture, road construction/maintenance, and harvesting. The probable causes of impairment include siltation, metals and pH(Id.).

Sediment evaluations conducted throughout the analysis area since the mid-1980's indicate that sediment levels in Telegraph, Jericho and Sally Ann Creeks are elevated, and that sediment levels in spawning gravels are at the upper limits of their historic range of variation (Jericho DEIS 1997).

3. Bitterroot River Drainage (See Appendix F)

Historically, WCT populations in this drainage were connected to the Bitterroot River and the Clark Fork River and movement throughout the system allowed genetic exchange (Stevensville Southwest EA 1994). Settlement in the Bitterroot valley drastically changed the status of WCT throughout the drainage. Irrigation systems that were established in the late 1800s and continue today have caused periods of no flows that eliminated trout populations and created barriers to movement and genetic exchange among populations. Fishing pressure also eliminated many populations of WCT from the drainage. Angling regulations continue to become more restrictive (Id.).

Extensive non-native fish introductions occurred throughout the system. Today, the pure WCT populations in the West Fork of the Bitterroot River are threatened by introduced non-native species, and WCT X rainbow hybrids are common (MRIS).

Populations are most abundant in wilderness and roadless areas within the drainage. Logging and mining practices have degraded the watershed, and excess sedimentation limits fish production (MRIS). Native WCT have a limited distribution because of upstream barriers and downstream dewatering and non-native competition (Stevensville Southwest EA 1994). Loss of the migratory form from the Bitterroot River is significant for this drainage.

Within the Bitterroot National Forest, WCT habitat ranges from fair to very good (Hoth, pers. comm. 1995). The Bitterroot valley is a different story. Irrigation diversions beginning at the forest boundary cause spawning tributaries to become dry (Id.). Rainbow trout, which leave their spawning tributaries immediately, are unaffected, while WCT, which stay in spawning tributaries for a few years, are lost. WCT fare better in high mountain streams with good habitat conditions where introgression with rainbow and brook trout is less likely. Rainbow trout fare better in the valley where habitat is more degraded (Id.).

WCT from the Hamilton Hatchery have been planted in Warm Springs Creek (Warm Springs Timber Sale EA 1996). WCT X rainbow hybrids have been found near the mouth of Warm Springs Creek, but pure WCT have been tested at the Crazy Creek Campground. Above the Crazy Creek Campground, WCT are found in Wiles, Porcupine, Crazy, Hart, Prayer, Fire, Base, and Fault Creeks. The East Fork Bitterroot River and Warm Springs Creek are both listed as water quality limited segments (WQLS) in Montana's 1994 Clean Water Act 305(b) report.

The cold water fisheries in the East Fork are threatened by habitat alterations, flow alteration, and siltation from agriculture, range land, and irrigated crop production. The East Fork has a variety of trout species, and has been heavily impacted by highway construction. Warm Springs Creek only partially supports aquatic life and cold water fisheries. Resources extraction, pasture land, agriculture, road construction/maintenance, feedlots, and surface mining have caused siltation, thermal modifications, and other habitat alterations. Road construction and timber harvest have increased sediment levels in the smaller streams, and perhaps also in Warm Springs Creek. In Bear and Crazy Creeks sediment production is up to six times natural levels (Id.). The Warm Springs Timber Sale, programmed for the period 1997-2000, would harvest about 1000 acres, build three new roads totaling about 0.9 miles in length, and rehabilitate approximately 19 miles of roads. The majority of the areas proposed for improvement cutting are classified as unsuitable for timber production (Id.).

Management activities are also proposed in the Fern Creek drainage. Logging and under burning are proposed on approximately 11,000 acres. Historically, streams within the analysis area probably were connected to the Bitterroot River and each other, allowing native WCT to move freely throughout the system. (Fern Creek EA 1996). Resident and fluvial life history forms were present. However, road construction, early railroad logging, livestock grazing, wildfire, and stream diversions have caused erosion and sedimentation to streams in the area. Bunkhouse, McCoy, and Wheedle Creeks are high risk watersheds for maintaining beneficial uses. WCT populations have been fragmented due to habitat loss, irrigation diversions, and non-native species. Native trout populations have been eliminated from some streams and artificially genetically isolated in others (Id.).

The Fern Creek EA states that Tin Cup and Little Tin Cup Creeks are in healthy condition. However, over five miles of Tin Cup Creek are listed as water quality limited in the 1994 305(b) report. The report describes cold water fisheries as threatened due to siltation from irrigated crop production. Harvesting and burning activities, which may effect water quality, also occur in this drainage.

Widespread introduction of non-native species (brook, brown and rainbow trout) has resulted in hybridization, predation and competition. According to the EA, "fish population estimates in Tin Cup Creek appear to reflect ongoing declines in the distribution of native bull trout and westslope cutthroat trout concurrent with increasing numbers of exotic trout" (Id.). Throughout the analysis area, WCT streams have been impacted by brook trout, irrigation withdrawals, and habitat degradation due to past management practices. Trout abundance is low due to the limited availability of suitable habitat and low nutrient concentrations. WCT have hybridized with Yellowstone cutthroat trout and rainbow trout. "Face" streams -larger streams draining the Bitterroot "face" -are generally in poor condition due to sedimentation from past timber harvesting, roads, and livestock grazing (Id.).

Timber harvests also are proposed in portions of Skalkaho Creek and Sleeping Child Creek drainages, including Railroad Creek, Hog Trough Creek, Weasel Creek, Bear Gulch and Two Bear Creek. The project areas include part of the Sleeping Child Inventoried Roadless Area (Bear FEIS 1996). The MRIS lists these streams as containing pure WCT. While some streams are in good condition, according to the Forest Service, there are currently about 5.8 miles of stream that are not meeting forest plan objectives. Railroad Creek is impacted by a road system that is a major source of sediment. Pool habitat is reduced and sediment deposition has embedded substrate. Woody debris is lacking. The stream is sensitive to any increase in sediment, and by the Forest Service’s own admission approximately 2 miles of the stream are not meeting the plan's desired condition (Id.).

According to the Camp Reimel Ecosystem Management Project, Environmental Analysis, WCT are found in the East Fork Bitterroot River drainage. Genetic testing has shown that the WCT in Reimel and Camp Creeks are pure. (Camp Reimel EA 1997). Reimel Creek contains about an equal mixture of brook and WCT. (Id.). Its flows seldom reach the East Fork because of water diversions and subsurface flows and these fish may be isolated. Reimel Creek is listed as a water quality limited segment (WQLS), and in need of Total Maximum Daily Load (TMDL) development. In the most recent 305(b) report, from 1996, the impaired uses include aquatic life support and cold water fishery -trout. The probable causes of impairment include other habitat alterations, siltation, and

suspended solids. (Id.).

The Camp Reimel EA states that Camp Creek is mainly a WCT stream, they are found throughout the main stem and in most of the larger tributaries. Brook trout are common in main Camp Creek and uncommon in the lower East and West Forks and Praine Creek. Some rainbow trout or hybrids occur near the mouth of Camp Creek. The Camp Creek watershed has had a variety of activities occur in the past including Highway 93 widening (1993-1994), timber harvest, road construction, and the 1960 Saddle Mountain burn. (Appendix G of the Camp Reimel EA 1997). Sediment yields are currently above the adjusted fish threshold when estimated to its' confluence with the East Fork of the Bitterroot River. (Id.). According to the EA, the WCT in Camp Creek have good breeding numbers, are connected to other populations nearby, and should have a low risk of extinction. However, this extinction risk does not take into account competing species, which are present. (Id.).

The West Fork Camp Creek has recovered slowly from past activities, channel stability is low, percent fines is high, and sediment yields are above thresholds. This stream is sensitive to increases in sediment and water yield. East Fork Camp Creek is also highly sensitive to increases in streamflow and sediment yields. It has a high percentage of smaller particle sizes in the substrate, the highway is a chronic source of sediment, and its slopes have not fully stabilized since reconstruction. Numerous land use activities currently impact this stream. Main Camp Creek has been impacted by road and highway construction and reconstruction, timber harvest, developed and dispersed recreation, ranching and farming, grazing, gravel pit development and small areas of mining. Sediment yields are over the adjusted fish thresholds. (Id.).

The EA states the most impactive effect to the fisheries resource is from increased delivery of sediment of streams from the construction and/or reconstruction of roads, and that impacts may result from increased water yields which can be attributed to timber harvest resulting in increased channel scouring and instream habitat loss. The Camp Reimel Ecosystem Management Project will log 3.9 mmbf from 1200 acres and building 3.5 miles of road within the 27,000 acre analysis area. (Camp Reimel EA 1997). Logging and roadbuilding are proposed within roadless lands adjacent to the Tolan and Allan Mountain roadless areas. This project includes a Forest Plan amendment that would allow an increased open road density of 2.3 and 2.9 miles per square mile in two drainages. (Id.) In addition, the Lost Trail Pass Ski

Expansion Project raises concern for potential increases in water yield.

Other WCT streams in the project area are impacted in various ways. For example, Dick Creek has a high amount of sand in the substrate and few pools, Andrews Creek is rated as high risk as high road and stream crossing densities provide sources of sediment readily to stream. Fish thresholds are exceeded at this time due to high road densities. Praine Creek is impacted by substantial road construction and timber harvesting on State Land. This watershed is high risk due to high road and crossing densities. It is naturally sensitive to increases in sediment and water yield. Waugh Creek has been impacted by past harvesting activity -there is little woody debris or pool habitat. It is at the less healthy side of the range, and would be sensitive to increases in water and sediment. (Id.).

C. FLATHEAD RIVER BASIN

According to the Upper Flathead System Fisheries Management Plan (1989-1994), WCT populations in this drainage have remained at fairly stable but low levels since the early 1980s. However, according to the Flathead Basin Commission 1993-1994 Biennial Report, numbers of WCT, along with bull trout and kokanee salmon, have shown a marked decline in many areas of the basin during recent years. Populations are highest in the smaller tributary streams, and spawning and rearing habitat is threatened by various human activities. Commercial timber land makes up nearly one-third of the six million acres of the Flathead Basin watershed (Weaver and Fraley 1991).

The MTFWP Monthly Progress Report for the Coal Creek/Flathead River Basin Monitoring Study states that the results from the Flathead Basin Forest Practice Study showed a linkage between ground disturbing activity and spawning habitat quality which is directly linked to survival to emergence. In 1996, the number of redds observed in the Flathead Basin ranged from 12 in the Murray Creek of the South Fork Flathead River drainage to 270 in Emery Creek of the same drainage. Only two waterbodies had more than 30 redds: Hungry Horse Creek and Emery Creek, both in the South Fork drainage. All other streams had between 12 and 30 redds.

(Id.).

Of 34 lakes sampled in the Flathead Basin, only six (17..6%) contained pure WCT populations (Leary, et al. 1990). Of 44 creeks sampled, 30 contained WCT populations. According to Pat Van Eimeren (USFS, pers. comm. 1996), fisheries biologist for the Flathead National Forest, Kalispell, MT, many more pure populations have been found due to additional sampling. Many of the pure populations are not protected against upstream or downstream migration of hybridized and introduced trout species and are continually threatened with future hybridization (Leary, et al. 1990).

Stocking of pure WCT has been used in an attempt to improve the status of the species in the Flathead. There has been an active stocking program since 1985 to return WCT to lakes populated with non-natives or hybrids (Houston, pers. comm. 1995). This program has been fairly successful in increasing the genetic purity of WCT in lakes. For example, one population increased from 86% to 95% pure. However, some biologists question the effectiveness of the stocking program and believe that genetic swamping is impossible (Shepard, MDFWP, pers. comm. 1995), or that stocking may be beneficial if the goal is recreational fishing, but is the worst possible option if the goal is to maintain genetic structure (Sanborn, USFS, pers. comm. 1995). Stocking of hatchery fish could also increase the chance of introducing nonnative pathogens.

1. Flathead Lake

Dams eliminated an estimated 50% of the habitat once available to migratory populations of WCT in Flathead Lake (Rieman and Apperson 1989). Migratory WCT originally used tributaries of all forks of the Flathead River and Swan River. However, Bigfork Dam, built in 1902, blocked fish migration from Flathead Lake into the Swan River, and Hungry Horse Dam, built in 1954, eliminated passage into the South Fork Flathead River (Weaver and Fraley 1991). Kerr Dam at the south end of the lake prevents upstream movement of WCT from the Lower Flathead River into Flathead Lake. However, a pre-existing waterfall at the site also may have acted as a barrier. Today, populations in the lower river are depressed (Van Eimeren 1996).

2. South Fork Flathead River (above Hungry Horse

Reservoir)

The upper Flathead River basin is the largest stronghold of genetically pure WCT in Montana, with the South Fork Flathead River being the largest and most secure portion within this area (Liknes 1984; Liknes and Graham 1988; Leary et al. 1990). However, most populations are not protected from future hybridization, and contaminating species are present. In addition, the entire river basin has been blocked off by Hungry Horse Dam, isolating the habitat and making it unavailable to migratory populations from Flathead Lake (McIntyre and Rieman 1995; Corsi, pers. comm. 1996). There is a migratory population from Hungry Horse reservoir, and at least one biologist thinks the dam may actually benefit the species due to the poor condition of Flathead Lake (Van Eimeren 1996).

The drainage is predominantly designated wilderness. However, MRIS identifies logging, road construction, and bedload movements as limiting factors.

3. Swan River

Numerous sources identify WCT populations as declining and highly fragmented throughout a greatly reduced range (Gangemi, Flathead Biological Station, Polson, MT, pers. comm. 1995). Threats include interbreeding with introduced rainbow and Yellowstone cutthroat trout, competition with brook trout, habitat deterioration (especially sedimentation, warm water temperatures, loss of channel habitat complexity and stability), and migration blockages (Id.). There are extensive road networks and clearcutting in this drainage.

According to MRIS, WCT are uncommon and most likely hybridized due to the abundance of rainbow trout. The habitat trend is deteriorating. Limiting factors include stock overuse, high numbers of non-native fish, sedimentation, logging and road construction, and the dam. Land and water uses in this area include irrigation, stock watering, residential, logging, and roads. Much of the drainage is primarily used for timber harvest, but rapidly increasing residential development directly impacts many riparian areas and lakeshores.

From 1987 through 1992, 40,000 WCT were planted annually and equally distributed from Condon Creek downstream. Due to the presence of competing and interbreeding species and the severely degraded habitat conditions, it is unclear what effect the planting will have.

4. Middle Fork Flathead River

Land uses in this drainage include low density residential housing, extensive roads, a railroad right of way, and occasional timber harvest (MRIS). Logging, roads, urban development, and the long-lasting effects of the large 1964 flood -have altered channel and bank composition and apparently limits fish production. The drainage contains especially valuable pure WCT populations but with rainbow trout and other contaminating species are present. It contains essential spawning grounds for Flathead Lake (MRIS). The population status of the WCT is declining in parts of the drainage, while reportedly improving in others (MRIS).

5. Glacier National Park (See Appendix G)

WCT is the only subspecies of cutthroat trout indigenous to Glacier Park (Marnell, et al. 1987). According to Marnell (1988), indigenous populations of WCT have been adversely affected by "a succession of human interferences spanning more than half a century." Lacustrine populations are imperiled by non-native species through 84% of their historical range in the park. Pure WCT populations are found in 16 park lakes in drainages of the North and Middle Fork Flathead rivers. While the number of lakes inhabited by WCT has not declined, the presence of nonnative salmonids threatens the long-term security of the species throughout a substantial portion of its historic range (Marnell 1988).

The North Fork Flathead River drainage represents the historical stronghold of WCT in Glacier National Park (Marnell 1988). However, among the ten lakes that contain WCT, only the pure populations in Quartz Creek Lake and Akokala Lake are free from "ecological disturbances" (Id.). Populations in several lakes have declined due to predation, competition, and hybridization. The decline of the WCT populations in McDonald Lake in the Middle Fork Flathead River drainage represents a potential loss of up to 95% of the species' historic Middle Fork range in the park (Marnell 1988).

Historic distribution of WCT in the South Saskatchewan drainage in the park was probably limited, and there were no lacustrine populations in the South Saskatchewan or Missouri River drainages (Id.). Present day populations in these drainages are few, if any.

Indigenous WCT populations seem to have an advantage over introduced Yellowstone cutthroat trout because of their ability to adapt to the park's harsh environs (Marnell 1988; Rieman and Apperson 1989). However, competition or predation by introduced kokanee salmon and lake trout may have led to declines in WCT populations in several park lakes.

D. KOOTENAI RIVER BASIN

There are limited pure WCT populations in the Kootenai River drainage. No pure populations exist in the mainstem Kootenai River, and rainbow trout are common. The WCT population in Dodge Creek is the only known pure WCT population on the eastern half of the Kootenai National Forest (Compartment 4 EA 1994). Its numbers are declining, and Dodge Creek has been seriously degraded by bank cutting, grazing, and fine sediments (Id.). Suitable WCT habitat in Lower Dodge Creek is severely limited. Riparian harvesting, livestock grazing and fishing are limiting factors. Large woody debris is uncommon, and fine sediment covers the stream bottom. As a result, brook trout, which out-compete WCT in degraded conditions, have prospered (Id.). While some portions of Upper Dodge Creek are suitable for WCT, peak flow increases have destabilized stream channels and reduced spawning and rearing habitat.

It is believed that WCT once occupied the Upper Sunday Creek watershed, but available evidence indicates they have been replaced by brook trout. No WCT were observed in a 1993 fish survey (Upper Sunday Timber Sales FEIS 1993). Keeler Creek and

Ruby Creek contain pure WCT, but have been degraded by logging. Inadequate pools are a limiting factor (MRIS).

According to Carolyn Hidy, fisheries biologist for the Cabinet District of the Kootenai National Forest, there are pure WCT in most headwaters in her Ranger District (Hidy, USFS, pers. comm. 1995). However, these populations are small, isolated, and fragmented, and are highly vulnerable to stochastic events and long-term habitat degradation. Logging and roads are the major threats in this area. Some roads built in the 1960s have begun to fail (Id.). Some projects have been developed in an attempt to reduce the likelihood of further damage to the watershed. Poor logging practices have also affected other Ranger Districts on the Kootenai National Forest (Id.).

In the Cabinet Ranger District, there is one grazing allotment along Beaver Creek, which is home to a pure WCT population. This creek has been severely degraded by floods, fires, harvesting, and grazing. While there is not an excessive amount of mining in the Cabinet District, creeks have been degraded by tailings and gravel.

WCT within the Rock Creek drainage have been verified as genetically pure, except in Rock Lake and Rock Creek Meadow where they are hybridized with introduced Yellowstone cutthroat and rainbow trouts (Cedar Gulch EA 1996). The Rock Creek population is viable, but highly threatened due to the potential movement of hybrid populations into the lower stream, brook trout competition, isolation from other populations by dams, reservoirs, and intermittent stream flows, and degraded habitat (Id.). Slow growth and low fecundity further reduce the resiliency and viability of this population (Id.).

Aquatic life and cold water fisheries are impaired in the Rock Creek watershed due to resource extraction and siliviculture. Other activities that will add to the cumulative effects of the Cedar Gulch project include the proposed ASARCO

Rock Creek Mine and planned harvesting on Crown Pacific lands (Id.).

1. Yaak River

There are pure WCT in the West Fork of the Yaak River, but contaminating species and WCT X rainbow hybrids are present (MRIS). Logging and road construction have degraded the watershed, bedload movement limits fish production, and the habitat trend is declining (MRIS). The pure population of French Creek is also threatened by contaminating species. The entire drainage has been heavily logged and roaded.

II. IDAHO (See Appendix B)

In Idaho, many populations are remnants and some are extinct (Rieman and Apperson 1989). It is estimated that strong populations (greater than or equal to 50% of historic potential) persist in 11% of historic range, while viable (strong and depressed) populations remain in 36% of historic range within Idaho. Depressed populations are defined as less than 50% of historic potential (Rieman and Apperson 1989; Van Eimeren 1996). Suspected pure populations exist in 13% of the species' historic range with only 4% of the historic range considered strong and pure (Rieman and Apperson 1989; Johnson 1992; Van Eimeren 1996). Because electrophoretic data is not available on most of the WCT populations there may be even fewer genetically pure populations in Idaho (Rieman and Apperson 1989). Declining abundance of migratory and resident stocks typify WCT populations in Idaho (Hungry Mill Timber Sales FEIS 1996).

Important populations in Idaho are in the Middle Fork Salmon, North Fork Clearwater, Lochsa, Selway, St. Joe, and Coeur d'Alene rivers. Only small numbers are present on most other streams of the Salmon River drainage and the South Fork Clearwater River (Liknes and Graham 1988). The Pend Oreille River has been blocked off by the Cabinet Gorge Dam, eliminating or isolating areas of WCT habitat once available to migratory populations (McIntyre and Rieman 1995).

Millions of Yellowstone and rainbow trout have been stocked throughout the range of the WCT in Idaho for decades, and today very few westslope populations have not been exposed to hybridization (Behnke 1992). Although there is debate regarding the effect of this stocking on WCT populations, in basins where

WCT and native rainbow trout are sympatric and they seem to exhibit spatial segregation. In the Salmon and Clearwater drainages where rainbow trout exist naturally, the two species exhibit strong segregation. WCT inhabit headwater areas while rainbow trout use the lower reaches (Rieman and Apperson 1989).

Kokanee salmon were introduced to all of the lakes in northern Idaho where WCT were once important (Rieman and Apperson 1989). Kokanee increased dramatically in Coeur d'Alene, Pend Oreille, and Priest Lakes concurrent with declines in WCT, perhaps caused by competition for food. However, there are some cases where WCT populations have remained strong despite high densities of kokanee, for example in Wolf Lodge Creek, a tributary of Coeur d'Alene Lake (Id.).

According to Rieman and Apperson (1989) there has been little management of WCT other than fishing regulations. Stocking of WCT was occurring in 0.3% of the range with active programs on Priest, Hayden, and Payette Lakes and Deadwood Reservoir (Id.). Habitat enhancement was occurring on 10% of the range, mostly in the South Fork Salmon River (Id.), although the success of the projects restoring cutthroat trout is unknown. Species removal has been used in less than 0.1% of the range (Id.). While fishing regulations have been successful in reviving some WCT populations, others have continued to decline.

In Idaho, 70-80% of the riparian areas, which are essential components of WCT stream ecosystems, are lost or severely degraded. Water quality limited streams are found in almost every river basin in Idaho. Most pollution comes from non-point sources such as mining, timber harvest, urban development, farming, and livestock grazing (Pacific Rivers Council 1995).

In many northern Idaho streams, bedload deposition has decreased stream stability and has produced porous and elevated channels. This has stimulate stream channelization and dewatered habitat, eliminating WCT habitat entirely or blocking fish movements (Rieman and Apperson 1989). According to Ned Horner, Region 1 Fisheries Manager, not much has changed since the Rieman and Apperson study, and that report presents a best case scenario (IFG, pers. comm. 1995). Northern Idaho watershed problems are in large part due to years of roading, logging and non-native fish introductions (Id.).

A. SALMON RIVER BASIN

The managed portions (non-wilderness) of the Salmon River basin have experienced a 43% reduction in large pool frequency in the past 50 years, while unmanaged (protected) portions have seen a 28% increase (Rieman and Apperson 1989). The South Fork Salmon River (SFSR) has been catastrophically degraded by landslides from logging roads and clearcuts (Pacific Rivers Council 1995). In the Middle Fork Salmon River, WCT populations showed a positive response to special angling regulations, but densities are still relatively low (Rieman and Apperson 1989).

According to the Upper SFSR and Johnson Creek Watershed Analysis (1995), cutthroat are found in ten sub-subwatersheds in the SFSR analysis area. All but two populations rate "low" in abundance. Cutthroat and bull trout are found together in five of these sub-subwatersheds. Johnson Creek supports a small population of fluvial WCT. WCT are present in only two tributaries to Johnson Creek, Bear Creek and Burntlog Creek, which support moderate populations. Disturbances in the SFSR and Johnson Creek watersheds include logging, road building, mining, grazing, and introduction of exotic species. Extensive management activities have led to degraded habitat and fragmentation of WCT populations.

Viability modeling predicts that the average and minimum population sizes for both SFSR and Johnson Creek are less than or equal to 300 and 50 adults, respectively (Upper SFSR and Johnson Creek Watershed Analysis 1995; Lee, unpub data). Moreover, there is an 86% probability that extinction of these populations will occur within 66 years or sooner (Id.).

According to the 1993-1994 IDFG Job Performance Report for the McCall Subregion, WCT fishing regulations on the South Fork Salmon River was changed to catch and release in 1986. The lower section of the SFSR (below the Secesh River) had not been samples since 1986. A study was conducted to determine if the WCT population had responded to the regulation change. Low densities of WCT (from 0.29 to .87 fish/100m²) were found in three of the four transects. This was a significant increase over that found in 1984 and 1985 when WCT were found in only one of the four

transects(Janssen et al. 1993). (See Appendix U-3).

The Middle Fork Salmon River has two known pure WCT populations; one in the upper end of Fisher Creek and one in the Yankee Fork drainage (Larkin, pers. comm. 1995). The presence of other pure populations is unknown due to lack of genetics research. According to Larkin, there may be other pure populations, because many have evolved with, and segregated from, rainbow trout and steelhead. Most of the migratory fluvial stocks have been lost because of roads, logging, mining, and overfishing for the past one hundred years. While wild areas support some strong populations, there are virtually none where development and management activities have occurred. Some of the upper tributaries of the Middle Fork Salmon River outside of wilderness areas have been severely degraded by overgrazing on Forest Service Land (Id.).

Big Creek, a tributary to the Middle Fork Salmon River, contains a substantial WCT fishery and was made a catch and release fishery in 1982. It remains similar to previous years sampling. There is concern, however, for the drop in number of 12 inch and greater WCT between Coxey Hole and Cabin Creek. It is unknown whether this is a result of habitat change or angling mortality. This section is a popular fishing area and angling mortality may be a problem(Janssen et al. 1993). (See Appendix U-4).

According to Larkin, much of the degraded habitat is being repaired due to the habitat restoration efforts for the endangered Snake River chinook salmon. It is unclear how this will affect WCT because of differing habitat requirements (Id.).

In the Salmon National Forest, 59 of the 70 streams identified as containing WCT populations also contain rainbow trout. Also, 59 of the 70 streams have vehicle access, indicating the presence of roads. (GAWS Level I Stream Habitat Inventory 1990). These factors increase the likelihood of hybridization and the probability of stream degradation within this area.

Although WCT were probably historically found in the Herd Creek watershed, no fish were found in surveys conducted in 1996 (Herd Creek Analysis 1997). Herd Creek is in the East Fork Salmon River subbasin. Current land management actions adversely affect fish population size and distribution within the watershed through indirect impacts on aquatic and riparian habitat (Id.). Actions include grazing, recreation, roads, trails, water diversions, and private land development. For decades, continual, unregulated livestock grazing in riparian areas and stream channels caused a steady decline in aquatic habitat conditions in the Herd Creek watershed. Present factors limiting salmonid production are excessive sediment and reduced water quality and quantity, caused by excessive grazing and two water diversions, originating on private lands. Loss of large instream wood, reduced organic materials, loss of bank stability, high cobble embeddedness, loss of quality pools, loss of beaver, and altered vegetative communities have all led to deteriorated conditions for salmonid spawning and rearing (Id.).

B. CLEARWATER RIVER BASIN (See Appendix H)

WCT occur in every major stream system and comprise the primary non-anadromous species in the Clearwater National Forest, which provides 13% of total State WCT habitat (Clearwater National Forest Plan EIS 1987, from now on Clearwater). According to Pat Murphy, fisheries biologist for the forest, the WCT are in good shape in the Clearwater and Salmon Rivers, but conditions worsen towards populated areas (P. Murphy, USFS, pers. comm., 1995). Every drainage except the Palouse and the Potlatch contains cutthroat trout (Id.). Because there has been no genetic testing, pure populations are unknown. According to Murphy, there are pure stocks "here and there," mostly in roadless and wilderness areas. Approximately one-half of the Clearwater National Forest is unroaded and there are about one-half million acres of wilderness (Id.).

Managed portions of the Clearwater River have lost 65% of their deep pools in the past 50 years. In the Clearwater National Forest, 71% of the drainages failed to meet forest plan standards for water quality. (Pacific Rivers Council 1995). Damage from old logging practices can be seen in the many roads cut next to streams (P. Murphy, USFS, pers. comm., 1995). The Dworshak Dam on the North Fork Clearwater River eliminated an estimated 50% of the habitat for cutthroat trout (Rieman and Apperson 1989).

The recently completed Clearwater Subbasin Ecosystem Analysis at the Watershed Scale provides an analysis of WCT conditions throughout the mainstem Clearwater River and its tributaries. Currently, genetic purity is unknown for all cutthroat populations found in this analysis.

Historically, WCT were most likely abundant throughout the headwaters of most of the mainstem Clearwater River tributaries. (Clearwater Subbasin Analysis 1997). The upper reaches of the Potlatch River and Lolo Creek drainages had healthy populations of WCT. WCT may have been present above Orofino Falls. In the Lolo Creek drainage within the USFS lands, the habitat conditions showed stable stream channels with high amounts of large organic debris, numerous high quality pools, and cool summer water temperatures. These conditions were very conducive to WCT production; populations were strong and most likely exceeded 5-10 fish (age 2+ or older)/100 squared meters of stream habitat. Fluvial populations of WCT that migrated to and from the mainstem Clearwater River were probably present; but the numbers were relatively low when compared to the resident populations. (Id.).

Logging, farming, grazing, road building, urban development, mining, and wildfire have all occurred in varying degrees within the watersheds and have increased erosion above natural levels. Stream channels have been extensively altered by farming, grazing, railroad and conventional logging and road building. The impacts of roads and road construction have had the greatest effect on the alteration of erosional processes on the landscape in recent years. The average road density for the assessment area is 4.42 miles of road/square mile. However, this number is being updated and the actual number is expected to be 30-40% higher. Summer water temperatures within the mainstem Clearwater River and its tributaries have been severely impacted compared to the pre-development period of the 1800's. (Id.).

Peak runoff in the watersheds of the Potlatch River has been increased by harvest activities, road building, channelization and grazing. Road density is 4.4 mi/sq. mile (is expected to be

30-40% higher). Harvest density is 15.9%. Base flows or low flows have decreased due to channelization and gully headcutting of the streams and lowering of the water table. Livestock grazing has decreased infiltration of runoff in the meadows, thus increasing runoff at the time of peak flows and decreasing streamflow during base flow periods. Less water is available to support both fisheries and riparian plant communities. Sediment production in the Upper Potlatch River is 149% over natural, and exceeds the geomorphic threshold. (Id.).

Approximately 102 miles of road have been constructed in the Orofino Creek watershed on USFS managed lands. The road density is a very high 6.0 mi/sq. mile. Harvest density is 47.5%. Management activities have led to a modeled 17% increase in peak runoff. Sediment production is 58% over natural and exceeds the geomorphic threshold. (Id.).

Approximately 580 miles of road have been constructed in the Lolo Creek watershed on USFS managed lands. The road density is 4.8 mi/sq. mile. Approximately 16,700 acres have received intermediate harvest and 21,000 acres have been regenerated. The harvest density is 48.8%. Sediment is 14% over natural and does not exceed the geomorphic threshold. (Id.).

Fish assemblages within the mainstem Clearwater River and its tributaries have undergone a change in composition of species and relative numbers over the last 100 years. Resident fish populations have been altered by past fish introduction efforts of other strains of rainbow trout, cutthroat trout and eastern brook trout and reductions/elimination of native fish populations. Tributaries of the mainstem Clearwater River currently support remanent populations of native fishes. (Id.).

WCT populations are currently present in a small portion of their probable historic range. Fish population data shows populations are present within the upper Potlatch River, Orofino Creek and Lolo Creek drainages. Kucera et al. (1983) noted that cutthroat trout were present within mainstem Clearwater River tributaries located within the Nez Perce Tribe Reservation. Surveys conducted in 1983 on portions of reservation streams located outside the reservation boundaries documented no WCT with the exception of the Lolo Creek drainage. (Id.).

Eastern brook trout exist in strong populations within the tributaries of the mainstem Clearwater River. Strong populations have been documented within the upper Potlatch River, upper Orofino Creek and upper Lolo Creek drainages. Introduced populations of rainbow trout also occur in the upper Orofino Creek and upper Potlatch River drainages as a result of IDFG fish stocking efforts. (Id.).

Cutthroat trout are identified as the beneficial use in the Clearwater National Forest Plan: Orofino Creek (low fish water quality objective), Trapper Creek (low fish), Gold Creek (moderate fish), Musselshell (above Gold Creek) (moderate fish), Lolo Creek (above Yoosa Creek) (high fish), Yoosa Creek (above Camp Creek) (high fish), Chimook Creek (high fish), Mox Creek (low fish), Yakus Creek (high fish), Yakus Creek (above Rat Creek) (low fish), Mud Creek (moderate fish), and Cedar Creek (moderate fish). Several of these streams are listed by the State of Idaho as Water Quality Limited Segments: Lolo Creek, Yoosa Creek, Chammok Creek, Musselshell Creek, Cedar Creek, Mud Creek, and Yakus Creek. All of them, except Cedar Creek, list sediment as the pollution. All streams, except Lolo Creek, are of low priority for TMDL development. Lolo Creek is medium priority.

Fluvial WCT use the South Fork Clearwater River as a travel corridor (Hungry-Mill Timber Sales FEIS 1996). Mill Creek and Johns Creek support both resident and fluvial life histories, although the low number of larger fish indicates that most WCT are resident. Isolated populations are found in Deer Creek and Black George Creek. The WCT in Deer Creek are the only gamefish found above the barrier in Reach 1 and may be genetically pure. This watershed is currently at 50% of its habitat potential. Cutthroat densities were only 19% of optimum. Past road failures on Road # 9427 have contributed excessive amounts of fine sediments to Deer Creek. Lower Mill Creek is affected by grazing, which has resulted in high temperatures and sedimentation. The Hungry-Mill project in the Nez Perce National Forest will harvest approximately ten million board feet from approximately 1,843 acres and construct or reconstruct approximately 2.6 miles of roads (Id.). Past road building,

timber harvesting, and cattle grazing have impacted cobble embeddedness and raised summer water temperatures throughout the project area (Id.).

According to the Project 806 Timber Sale Decision Notice and Finding Of No Significant Impact, South Fork Clearwater WCT use both resident and fluvial life-history strategies. During August of 1994, an Idaho Department of Fish and Game survey crew snorkeled over 1,000 feet of the South Fork between Mile Marker 13 and the mouth of Newsome Creek. In that distance, they

observed only one 5-inch cutthroat trout. Water temperatures in the South Fork are thought to have approached the critical thermal maximum for cutthroat in 1994. (Project 806 DN and FONSI 1997).

Low densities of cutthroat trout were observed in Leggett Creek (1.3fish/100m2) and Little Leggett Creek (6.4 fish/100m2) during 1990 stream surveys. Cutthroat were also observed throughout most of Fall Creek in 1994 surveys. Low densities of cutthroat were observed during electroshocking in Reed Creek in September of 1996. (Id.).

Watersheds in the project area are already degraded from activities such as large-scale dredge mining, hydraulic mining, grazing, logging, and roadbuilding. (Project 806 Environmental Assessment, June 1997). Nineteen percent of the South Fork basin administered by the Forest Service has been harvested within the past thirty years, and there are approximately 2,100 miles of road. Existing aquatic integrity is considered moderate. (Id.).

The Project 806 EA recognizes that fish populations numbers in the South Fork have declined significantly from historic levels, partly due to habitat alteration. Conditions in the South fork are degraded, sediment deposition is believed to be above natural levels and summer water temperatures are high. Habitat complexity has been reduced, and fish populations are vulnerable to sportfishing in streams that have been simplified. In addition, the EA recognizes that the condition of 68% of the tributary watersheds are below Forest Plan Standards, and that 57 percent of the land area within the South Fork watershed has a watershed condition concern rating of "high" due mostly to human activities. (Id.).

According to the Biological Assessment for the Chicken Nugget Timber Sale on the Nez Perce National Forest, WCT are present in the Newsome Creek and Big Elk Creek watersheds. (Chicken Nugget BA/BE 1997). The Newsome Creek drainage is in the South Fork Clearwater River basin. It is a degraded system: Newsome Creek and most of its tributaries are WQLS, listing sediment as the pollution of concern. Much of the drainage has been highly impacted from historic mining; the entire stream channel has been altered; most of the riparian vegetation, especially large woody debris has been removed from the system. 207 miles of roads are in the watershed. (Id.).

The fish/water quality objective from the Forest Plan (1987) is 90% of potential for

Nugget, Bear, Lower Newsome, and Beaver Creeks. Current fishery habitat potential is 50% for Nugget, Bear, and Lower Newsome, and 80% for Beaver Creek. The Newsome drainage is a Forest priority watershed for fish habitat improvement and watershed restoration. The effects of historic mining is apparent throughout the watershed. (Id.).

At the mouth of Newsome Creek, WCT have been observed 5 of 8 years with densities from 0.10 to 0.21 fish/100m2. At four miles from the mouth, WCT have been observed 3 of 8 years with densities from 0.16 to 1.95 fish/100m2. All WCT were less than 12" in length. (Id.).

Resident populations of WCT are the most abundant fish in most tributaries of Newsome Creek. Total density of WCT within Beaver Creek was 3.28/100m2 within the first seven km. The overall density of WCT in Bear Creek was 8.75 fish/100m2. Most other tributaries within Newsome Creek had similar densities. Most WCT were resident fish from 3 to 6 inches in length. (Id).

WCT within Big Elk Creek are most prevalent above stream mile 6.5, with densities ranging from .08 to .21 fish/m2 (1+ yearlings). WCT were noted present at monitoring sites along stream mile 2.3 but not at stream mile 2.2. (Id).

Big Elk Creek flows into the American River. It is either at or above thresholds for sediment and temperature. Water temperature is high and exceeds State Water Quality Standards. The stream is below the Nez Perce Forest Plan water quality objective. The poor condition of Big Elk Creek is the result of the cumulative effects of grazing, road construction, and logging. (Id.).

The North Fork of the Clearwater River contains all three life-forms of WCT - resident, adfluvial and fluvial. Fish Lake supports a population of adfluvial WCT. Their populations have most likely been reduced from historic conditions (Johnson 1992).

Any land management activities have the potential to impact this singular fish stock.

The North Fork has fluvial populations of WCT. They spawn in the tributaries and return to the larger systems such as the North Fork and Kelly Creek (Johnson 1992). Ongoing threats to this life-form are fishing pressure, loss of habitat caused by the dam, logging, mining and hybridization (Id.) Especially threatening is the ongoing hybridization with rainbow trout.

Resident WCT are found in most tributaries of the North Fork of the Clearwater River (Johnson 1992). Logging and roads are the greatest threat to this lifeform. Many streams that have resident WCT have been recognized to have sedimentation problems, these are primarily in the roaded areas and fine sediment is problematic (Id.)

The Clearwater Forest Plan is scheduling logging and roading for many of the roadless area acres in this watershed (Johnson 1992). The higher quality habitat in the roadless areas tends to support more WCT abundance and stability (Huntington 1995). The entry into roadless areas for timber harvest has the greatest potential for a downward trend in WCT viability in the North Fork.

According to the 1990 IDFG Region 2 fisheries management investigations, Job Performance Report, WCT densities in the Little North Fork of the Clearwater River were as consistently low as seen in 1988 and 1990. (Cochnaur and Schriever 1990). **(See Appendix U-5).**

C. SPOKANE RIVER BASIN

Introductions of brown trout, brook trout, and rainbow trout together with changes in flow and water quality are responsible for the demise of the westslope cutthroat trout in this drainage (Behnke 1992; DICRB 1995). Surveys of managed and unmanaged sub-basins in the Coeur d'Alene and St. Joe watersheds indicate that intensive management caused significant changes in both the stability of stream channels and the condition of fish habitat. Depth and volume of pools significantly decreased in managed watersheds versus unmanaged areas (Horner 1993).

1. St. Joe River

The St. Joe River is one of the two major tributaries of Coeur d'Alene Lake. The WCT population here is perhaps the strongest of any northern Idaho stream (Horner 1993). Until recently, land management activities had not impacted this drainage nearly as much as the Coeur d'Alene drainage. Unfortunately, this is changing, with the exception of the very upper reaches of the St. Joe system (Corsi, pers. comm. 1996). Particular threats are checkerboard ownership, salvage logging, and grossly under-funded maintenance of the existing national forest transportation system (Id.).

Snorkeling surveys done in 1990 and 1991 by Joel Hunt for the University of Idaho revealed cutthroat numbers ranging from 344 to 732 fish per mile in the catch and release sections of the St. Joe and from 98 to 162 fish per mile in the limited harvest area (Id.). Overall densities were 21,400 cutthroat trout in the 65 mile section from Calder upstream to Ruby Creek (Id.). These densities were much higher than in the Coeur d'Alene drainage which is similar in size, geology, and angling regulation. The major difference between the two drainages is the amount of degradation due to land-use activities (Horner 1993).

2. Coeur d'Alene River (See Appendix I)

Historically, the Coeur d'Alene River, Coeur d'Alene Lake and Hayden Lake supported exceptional WCT fisheries (Gamblin 1988). By 1970, WCT numbers had declined dramatically due to angling overharvest and loss of habitat from mining, logging, and road construction (Id.). Over the last decade, there has been a continued decline in fish abundance and loss of habitat in the Coeur d'Alene basin (Lider, pers. comm. 1995). The long-term viability of cutthroat populations in the Coeur d'Alene watershed is in question (Horner 1993).

Snorkeling surveys indicate that the only section on the North Fork of the Coeur d'Alene River that supports fish densities similar to the St. Joe River is the twelve mile catch-and-release portion between Yellow Dog Creek and Teepee Creek (Horner 1993). Fish densities were about 372 fish per mile, or about 4,400 fish. Other catch-and-release sections supported only 10 to 56 fish. Densities were lowest in the headwater areas with the most damage to fish habitat (Id). In downstream reaches where harvest was allowed, cutthroat were more

abundant. Similar results were seen on the Little North Fork of the Coeur d'Alene River. The catch-and-release reach from Laverne Creek to Iron Creek supported 11 fish per mile. Downstream harvest areas supported about 37 fish per mile (Id.). Horner (1993) concluded, "The message is clear: After fish habitat has been lost or degraded, restrictive regulations are no longer effective in restoring cutthroat populations."

The following comparison between the North Fork Coeur d**’Alene River and the St. Joe River, and between catch-and-keep and catch-and release sections of these rivers, is based upon the IDFG Annual Performance Report for the Panhandle Region:(See Appendix U-6)**

WCT densities estimated from snorkeling transects in the catch-and-release sections of the North Fork Coeur d’Alene, Little North Fork Coeur d’Alene, and St. Joe rivers were 80, 5, and 277 trout/ha, respectively. In the catch and keep sections of the same streams, densities were 50, 5, and 35 trout/ha, respectively. (Davis et al. 1995).

In the North Fork Coeur d**’Alene River, the estimated density of WCT was 80 fish/ha and 50 fish/ha in the catch-and-release and the catch-and-keep sections, respectively. The density of trout larger than 300mm was higher in the catch-and-release section than in the catch-and-keep section. The number of WCT per transect was higher in 1995 than in 1994. This is attributed to warmer water temperatures in 1994 which forced the WCT into cooler tributaries.**

In the Little North Fork Coeur d’Alene River, the estimated density of WCT was 5 fish/ha in both the release and keep sections. The number of WCT per transect continued to be low relative to other waters with similar fishing regulations. No WCT larger than 300 mm were observed.

In the St. Joe River, WCT densities were estimated to be 277 fish/ha and 35 fish/ha in the release and keep sections respectively. The difference may be attributed, in part, to harvest of trout more than 356 mm TL. WCT numbers per transect was more in 1995 than in 1994. This is attributed to water temperatures, which were higher in 1994. The higher temperatures may have forced WCT to seek cooler water in tributaries.

The lack of instream trout cover, i.e., deep pools, large woody debris, in the North Fork and the Little North Fork probably contributes to the lack of WCT in these rivers. It is believed that the higher densities of WCT in the unroaded catch-and-release section of the St. Joe River than in the unroaded catch-and-release sections of the North Fork and Little North Fork is a result of more pools and large woody debris that provided cover for the WCT in the mainstem river.

The differences in WCT densities between the St. Joe and the North Fork rivers and within the catch-and-release sections of the North Fork appeared to be related to habitat quality. WCT densities were greater where habitat quality appeared to be adequate, and the better the habitat the higher the WCT densities. Where habitat quality appeared low, WCT densities were low. Fishing regulations, i.e. catch-and-release, will not improve WCT densities when trout habitat is poor.

In the late 1980s, trout densities were low in the majority of streams, especially in tributaries to the North Fork Coeur d'Alene River (Gamblin 1988). In Coeur d'Alene River and Hayden Creek tributaries in the Fernan Ranger District, instream trout habitat was reported to be suboptimal in the majority of stream study reaches (Gamblin 1988). Other instream habitat conditions may have limited WCT populations more than the effect of fine sediments on embryo survival (Id.). Excessive bedload sediment deposits filled many stream channels, creating a porous "pad" through which the stream flowed subsurface. Impacted streams that retained surface flows through the summer were generally poor in fish holding or rearing habitat and supported lower densities of fish than did streams with lower bedload sediment levels. The common denominator among streams with low numbers of trout was poor rearing habitat associated with a lack of instream structure and excessive deposits of large bedload sediment (Id.).

Seventy-five percent of the streams in the Coeur d'Alene basin are degraded due to intensive mining and logging for the past 100 years (Lider, pers. comm. 1995). Highway construction has produced impassable culverts, and it is believed that high transport of large bedload material in tributaries of the North Fork Coeur d'Alene River resulted in extensive loss of rearing habitat (Gamblin 1988; Rieman and Apperson 1989). The Fernan Ranger District has roughly 2,500 miles of road, with a mean road density of 4.5 miles of road per square mile area (Horner 1993). Although WCT are found mostly in headwaters and rainbow trout in the lower reaches, overlap occurs and hybridization is likely (Rieman and Apperson 1989).

WCT populations in the South Fork Coeur d'Alene drainage have been decimated by logging, development, and, most of all, toxic mining residue (Corsi, pers. comm. 1996).

According to the Coeur d'Alene Basin Natural Resource Damage Assessment (1996), large amounts of zinc and lead move through the Coeur d'Alene basin and are redeposited in the river, floodplain, and lake. 327 tons of lead and 1100 tons of zinc entered Lake Coeur d'Alene during 1993 and 1994. The average zinc concentration for these two years exceeded the acute criteria for the protection of fish at test sites on the Coeur d'Alene and South Fork Coeur d'Alene Rivers. Samples rom the North Fork were well below acute criteria. (Natural Resource Damage Assessment 1996).

The Assessment states that metals in the Coeur d'Alene Basin are bioavailable, and that concentrations of metals in sediment, biofilm, invertebrates, and fish from the impact area are significantly greater than those found in the St. Joe River, North Fork of the Coeur d'Alene River, and the South Fork of the Coeur d'Alene River upstream of Canyon Creek. There is a demonstrated pathway of metals from sediment to biofilm to invertebrates to fish. (Id.).

Tests were conducted to determine if cutthroat trout would avoid metals at concentrations typically found in waters of the Coeur d'Alene Basin. The data clearly shows that cutthroat trout avoid water with metal concentrations similar to that of the impacted surface waters of the Coeur d'Alene Basin. (Id.).

Coeur d'Alene Lake most likely contains the strongest remaining large lake population of WCT. This may be partly due to absence of lake trout (DHCA for WCT 1995).

The Idaho Panhandle National Forests have adopted "Habitat Action Plans" for bull trout and WCT and established citizen working groups to assist in developing ecosystem management strategies for these species (Horner 1993). In streams like Steamboat, Moon and Emerald creeks, fisheries and watershed projects, often associated with timber sales, have been established.

3. Wolf Lodge Creek

This drainage extends downstream to Lake Coeur d'Alene. Historically, it supported a major run of WCT that was one of the larger migratory populations north of the Clearwater River (Lukens 1978; Horizon Forest Resource Area FEIS 1991, from now on Horizon). Adult WCT from Lake Coeur d'Alene migrate upstream and spawn in Wolf Lodge tributaries. The adult fish return either to the lake or the Spokane River after spawning. Juveniles migrate to the lake after spending two to three years in Wolf Lodge streams (Id.). Surveys done in 1995 show severely depressed WCT populations in Wolf Lodge Creek (Corsi, pers. comm. 1996).

Fish populations and production have declined noticeably over the past 10 to 15 years in north Idaho, including Wolf Lodge Creek (Horizon 1991). Floods and management activities have altered fish habitat, especially in the mainstem Wolf Lodge Creek. Roadbuilding, timber harvesting, and past removal of instream debris has changed runoff patterns and bedload sediment displacement causing stream channel instability. Overgrazing, residential development, removal of riparian vegetation, and the construction of underground petroleum products pipelines have significantly impacted the area and have led to a decline in natural trout habitat. Large numbers of fish were killed by a major gasoline spill in 1983 (Id.).

According to 1990 stream habitat surveys, the Wolf Lodge watershed contains some reaches of relatively good fish habitat. Other stream reaches and smaller tributaries had fair quality fish habitat (Horizon 1991). Overall, stream habitat conditions range from poor to fair with only a few reaches in good or excellent condition. Lack of rearing pools throughout the drainage is a major limitation on fish production. There is also a significant lack of LWD which is important for creation of pool habitat and cover. Widespread removal of woody debris during flood rehabilitation projects in the mid-1970s has had a detrimental impact on fish habitat and production. Periodic disappearance of flows in portions of Stella, Lonesome and Marie Creeks and their tributaries is also a major factor affecting fish production (Id.).

Due to concern over current population levels and the importance of the fish resource, fishing is prohibited in the Wolf Lodge Creek drainage, and the creek is designated as a Stream Segment of Concern by the State of Idaho. Restoration projects have been completed in Stella and Lonesome Creeks, and other projects are planned to improve watershed and fish habitat. Mitigation measures have been initiated in some creeks prior to or as part of timber sale activities. Marie and Upper Wolf Lodge Creeks, as streams "considered critical to the maintenance of river and lake populations of special concern," are presumably managed at a higher standard than other fish-producing streams on the Idaho Panhandle National Forests (Id.).

D. PRIEST/PEND OREILLE BASIN

1. Priest Lake

WCT in Priest Lake are preyed upon by introduced lake trout and native bull trout (Rieman and Apperson 1989), and populations declined after introduction of kokanee salmon. Overfishing also had a major impact on WCT populations (Corsi, pers. comm. 1996). There are some healthy tributary populations and despite declines from historic abundance Priest Lake retains a relatively healthy population (Id.).

2. Pend Oreille Lake

Cabinet Gorge Dam eliminated access to over 90% of the historic spawning and rearing habitat once available to adfluvial fish (including WCT) in the Clark Fork River in Pend Oreille Lake.

Native cutthroat, bull trout, and introduced rainbow and brook trout are distributed throughout the Pend Oreille Lake drainage (Hoelscher and Bjornn 1989). WCT are the most widely distributed while rainbow trout are the most abundant. WCT are the most abundant above barriers. They are found primarily in upper stream sections when rainbow trout are present and along the entire stream length when rainbow are not present (Id.; Pratt 1985; Rieman and Apperson 1989). There is some segregation between WCT and introduced rainbow trout, but more habitat overlap occurs than where the two species occur naturally (Rieman and Apperson 1989). In many streams hybridization is common because of shared habitat (Id.).

A recent study of WCT and bull trout in the Lower Clark Fork River (LCFR) found that "Adfluvial [WCT] are unlikely to persist in Pend Oreille tributaries as genetically pure populations. **Several isolated resident [WCT] populations may exist, and continue to persist, in the basin." (Pratt and Poff 1996). The study also found that migratory and resident cutthroat trout populations do exist in the Pend Oreille area, but the migratory population is probably small and densities of cutthroat trout were low (<5fish/100m2) in areas accessible to adfluvial fish. Resident cutthroat trout may use areas that are either accessible or inaccessible to migratory stocks, and several isolated resident populations live upstream from waterfalls in the basin. (Id.).**

The study recognizes that WCT were widespread and abundant in the 1950's, but that ***"today the species is ubiquitous, but not abundant, in most of Lake Pend Oreille's tributary watersheds.*** **Three areas may still support high densities of [WCT]: upper reaches of North Gold, upper reaches of South Gold, and Twin Creek." (Id.).**

Genetic introgression between rainbow and cutthroat trout occurs in the Pend Oreille basin. However, information on genetic purity is not available for streams in the basin, so the distribution of introgression remains uncertain. (Id.). In addition, cutthroat trout spawning areas are poorly defined in the Pend Oreille basin. Pratt (1985) used the presence of fry and fingerling size cutthroat trout to define spawning areas, finding a patchy distribution of potential spawning sites. Hoelscher (1993) considered this a minimum spawning distribution. (Pratt and Poff 1996).

A small number of cutthroat trout use the mainstem of the Clark Fork River. While it is unlikely they would spawn in

there, WCT probably move into the Clark Fork River to feed in the summer and may overwinter in the rivers. (Id.).

Lake Pend Oreille habitats may be similar to the historic period, however availability of habitat components to WCT is probably very different because of the many introduced species in the lake. **One of the most pointed differences might be the availability of food. Cutthroat trout feed on zooplankton, aquatic insects and terrestrial insects. Historically, they were one of three native salmonids feeding in the pelagic zone, and the only native salmonid feeding at the surface in the summer. Today introduced salmonids use this niche. Kokanee feed extensively on zooplankton and will feed at the surface in the summer. (Id.).**

Idaho's management plan for WCT in Lake Pend Oreille calls for maintaining wild populations of cutthroat trout and increasing cutthroat trout harvest. Harvest regulations permit anglers to keep WCT. (Id.).

A cutthroat trout enhancement program currently rears juvenile [WCT] in net pens during part of the year, before releasing them into Lake Pend Oreille. The fish from this program appear to disperse into spawning habitats accessible to the lake. (Id.).

III. WYOMING

Historically, WCT occupied approximately 12-15 streams in the headwaters of the Madison River and Gallatin River drainages in Yellowstone National Park (Van Eimeren 1996). Currently about 6 populations remain, all of which are hybridized with Yellowstone cutthroat or rainbow trout to some degree (Id.; Fishery and Aquatic Management Program in Yellowstone National Park 1993).

Two tributary streams contain populations with genetic purity greater than 98% (Van

Eimeren 1996) and both are in Yellowstone National Park. In the Madison River basin, Cougar Creek has WCT (D. Mahoney, Yellowstone National Park, pers. comm., 1997). Cougar Creek has a natural barrier, it flows underground so that it does not connect with higher order streams. It is a naturally isolated population.

Fan Creek is a tributary of the Gallatin River within Yellowstone National Park. Surveys indicate two unnamed tributaries in the headwaters of Fan Creek have >98% pure WCT populations (Mahoney, pers. comm., 1997).

IV. OREGON (See Appendix J)

In Oregon, westslope cutthroat trout distribution is limited to 23 populations confined to isolated headwater streams within the upper mainstem and North Fork John Day River Basin (Behnke 1992; Van Eimeren 1996). All have a resident life history. WCT historically occupied about 10% of the North Fork John Day River drainage and currently occupy 1%. In the upper mainstem, WCT historically occupied about 25% of the drainage and presently occupy only 5% (Van Eimeren 1996). Most populations occur on private land (Id.). WCT are believed to have occupied 179 miles in the two drainages and currently occupy 73 miles or 41% of historic range (Id.).

Fish habitat in the John Day River Basin has been degraded by low summer flows, high summer and low winter water temperatures, accelerated bank erosion, excessive stream sedimentation, and reduced cover (USFWS 1981). Changes in channel structure, riparian vegetation, and flow regimes result from agricultural development, irrigation diversions, cattle grazing, and timber harvesting.

WCT populations in the upper mainstem are "at risk" due to "the vulnerability of its shrinking habitat and critical habitat requirements" (Van Eimeren 1996). Although the current trend may stabilize due to fishing regulations, habitat restoration efforts and watershed/ecosystem restoration, the long term trend is downward. Populations in the North Fork are "at risk and declining" for the same reasons (Id.), and there is potential for further decline with proposed salvage timber sales and ongoing public lands grazing. 1992 trap counts from diversion screenings in the John Day River were 42% of the 10 year average (Kostow, et al. 1994).

The WCT in the John Day tributaries are some of the only WCT that coexist in the same habitat with resident rainbow trout without hybridization or decline (Trotter 1987).

V. WASHINGTON

There are several disjunct populations of WCT in the Methow, Entiat, and Wenatchee rivers (Behnke 1922; DHCA for WCT 1995). The Washington River Information System lists 1,557 stream miles occupied by WCT. The most occupied miles are located in the upper Yakima, Wenatchee, Methow, Lake Chelan, and Pend Oreille drainages, respectively (DHCA for WCT 1995). It is presently unknown how many native populations remain and how many are the result of extensive stocking of WCT since the early 1900s (Id.). In the early 1990s, eighty-four sites were sampled within the Methow, Wenatchee, and Entiat river watersheds (Proebstel, et al. 1995; Van Eimeren 1996). Only 20 sites contained pure or "essentially pure" populations (Van Eimeren 1996). Most populations were found on national forest lands (Id.).

According to Mullan, et al. (1992), redband trout and WCT maintain genetic integrity in the Methow River drainage by segregation along thermal gradients. WCT populations in Cutthroat Creek and Early Winters Creek represent some of the purest WCT in the Methow drainage. In the Twisp River drainage, some hybridization has occurred (Proebstel and Noble 1994; DICRB 1995). Pure populations were found in higher gradient headwaters, but were hybridized in most streams below these areas (Proebstel and Noble 1994).

The WCT from both Twin Lake and Kings Lake are excellent representatives of pure WCT (Behnke 1992). The WCT from Twin Lakes has been used as brood stock since 1915. No fishing is allowed in these lakes.

Decline of adfluvial WCT in Lake Chelan were noted as early as the 1920s (Van Eimeren 1996). Resident populations appear stable in Washington where known, but the status of numerous populations are unknown (Id.). Angler pressure may be the greatest threat, but other factors, like habitat degradation, competition, and hybridization remain largely unquantified (Id.).

VI. ALBERTA

WCT are native to the Bow and Oldman watersheds which eventually join the South Saskatchewan River drainage. They were introduced into the Peace, Athabasca, North Saskatchewan, and Red Deer River drainages. Beginning with the arrival of the Canadian Pacific Railroad in the early 1880s, there was widespread stocking of non-native trout throughout the east slopes of the Rocky Mountains in Alberta within the historic range of the WCT. Due to competition with stocked trout and hybrid cutthroats and hybridization with rainbow and Yellowstone cutthroat trout, there are few native WCT populations left (Nelson and Paetz 1992; Carl and Stelfox 1989). There were few pure populations known to exist by the early 1980s (Nelson and Paetz 1982). According to the 1989 report by Carl and Stelfox, there is concern for the status of WCT in Alberta.

Job Lake, in the North Saskatchewan River Basin was stocked with WCT from Marvel Lake (this formerly fishless lake was stocked with WCT from the nearby Spray Lakes) in 1965 (Carl and Stelfox 1989). This has produced a viable population that has served as the main WCT stocking source in Alberta since 1970 (Carl and Stelfox 1989; Nelson and Paetz 1992). However, the lack of genetic variability is a problem and may result in poor performance and decreased survival rates (Carl and Stelfox 1989). Continued widespread stocking into possibly genetically pure WCT streams remains a concern (Mayhood, pers. comm. 1997).

Picklejar Lakes #2 and #4 contain pure WCT. These populations are a rare example of shoal-spawning WCT. Risk of overexploitation and the lack of genetic variability in these populations are causes for concern. This long-protected stock was recently reopened to angling (D. Mayhood, Freshwater Research Limited, Calgary, AB, pers. comm. 1997). The lack of variability may indicate the effects of genetic drift, small founding

populations, and/or a serious and recent reduction in population size (Carl and Stelfox 1989).

The Ram River drainage has an introduced presumed pure stock (it has not been genetically tested) which was obtained from southeastern B.C. (Nelson and Paetz 1992).

In the late 1800s and early 1900s WCT populations were reported in Banff National Park and at Twin Falls between Upper and Lower Kananaskis Lakes, Lower Kananaskis Lake, and the Kananaskis River. Today, WCT are practically gone from the Kananaskis system (D. Mayhood 1995). The waterfall at Twin Falls is now dry, the lake levels have been raised, and the system is managed for hydropower. They are virtually extirpated from the Bow River Basin below Lake Louise and only a few highly isolated populations remain (D. Mayhood 1995).

Within 90 watersheds of three sub-basins of the South Saskatchewan River system - Willow Creek (Oldman River), Crowsnest River, and Oldman River, westslope cutthroat trout now are known to occupy 15% less stream length than occupied historically, with present genetic purity unknown (Mayhood, pers. comm. 1997). Truly native, genetically pure WCT are now probably very rare in the area. (Mayhood, pers. comm. 1997).

Introduced hatchery cutthroat trout in Gorge Creek experienced high and relatively rapid mortality (Behnke 1992).

Most remaining genetically pure WCT in Alberta are a result of a stocking program. "These mainly introduced populations are genetically uniform and thus may be especially vulnerable to environmental change" (Mayhood 1991).

VII. BRITISH COLUMBIA

There are only a few disjunct populations of WCT native to British Columbia (Behnke 1992). Little is known about the status of these populations, although stocking does occur. A genetic study of several drainages was conducted in 1986. Fish were collected from tributaries of the Bull River, Elk River, Goat River, Gold Creek, Moyie River, Saint Mary's River, Skookumchuck Creek and Wigwam River (B.C. Habitat Conservation Foundation 1986). At that time, these populations of the upper Kootenay River drainage were found to be genetically pure westslope cutthroat trout (Leary et al. 1987).

It appears likely the fate of the WCT in British Columbia is similar to that in the rest of their range: declining populations threatened by degraded habitat and hybridization with non-native fish.

For example, in the Kootenay-Boundary Land Use Plan, British Columbia has approved a massive 5 year logging and road building project in the Wigwam drainage just north of the border in the Kootenai watershed of Canada. This area provides critical spawning for WCT. Some project units are as large as 600 acres - to be clearcut within the next 5 years. Numerous roads will increase access to fishable streams and increase fishing mortality. (Montgomery, personal comm. 1997).

FACTORS AFFECTING THE SPECIES

The Endangered Species Act requires the Service to determine whether a species is a threatened or endangered species[2] because of any of the following factors, 16 U.S.C. Sec.

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[2] **The ESA defines "endangered species" as "any species which is in danger of extinction throughout all or a significant portion of its range" and "threatened species" as "any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." 16 U.S.C. Sec. 1532.**

1533(a)(1):

(A) the present or threatened destruction, modification, or curtailment of its habitat or range;

(B) overutilization for commercial, recreational, scientific, or educational purposes;

(C) disease or predation;

(D) the inadequacy of existing regulatory mechanisms; or

(E) other natural or manmade factors affecting its continued existence.

The Service must make this determination "solely on the basis of the best scientific and commercial data available." 16 U.S.C. Sec. 1532(b)(1)(A).
Proof of the drastic decline of the WCT is found in scientific literature dating at least as far back as 1959 (Hanzel 1959). Hanzel found populations of WCT restricted to the headwaters of major drainages which originally had been entirely inhabited. Today, even the strongest populations in the Flathead Basin in Montana are in jeopardy. This decline is attributable to habitat degradation and loss, genetic introgression, competition by introduced non-native fishes, and over-fishing.

The Technical Summary for WCT in the Upper Missouri Basin summarized population extinction theory based on the work of top scientists: The process of extinction may be placed into three major categories: deterministic, stochastic, and genetic. Deterministic extinction occurs when a permanent or long-term change causes a population to decline to zero (Gilpin and Soule' 1986, USFS/BLM 1996c).   Review of existing information indicates that deterministic factors are now causing extinction of some WCT populations within the Upper Missouri River Basin. The two primary deterministic risk factors underlying the high risk of extinction are introduced trout species and degraded habitat conditions within streams(Id.).

Stochastic risks are random demograohic and environmental events which lead to a population crash (USFS/BLM 1996c). Demographic stochasticity probably is unimportant unless total population size becomes very small (Id.). For example, within the Upper Missouri River Basin all WCT populations inhabit isolated headwater streams. As the majority of these headwater streams have been adversely effected by either land/water management activities or invasion by non-native salmonids, or both, the risk of extinction from stochastic environmental effects (chronic and/or catastrophic) is therefore, believed to

be high (Id.).

Genetic extinction can be linked to the loss of genetic diversity within a species. When diversity decreases, the combination of genes that permit a species to survive in a highly variable environment are lost. This decreases a species ability to adapt to changed environmental conditions (Id.). For example, within the Upper Missouri River Basin the "risk of extinction" to WCT is associated with the relatively high level of genetic divergence among populations The loss of additional populations will probably result in loss of genetic diversity within the subspecies. Geneticists have recommended conservation of as many populations throughout their range as necessary to conserve the genetic diversity presently contained within this subspecies (Allendorf and Leary 1988;USFS/BLM 1996c**).**

While the main reasons for decline vary across the WCT's range, all of the ESA factors are present. In Idaho, WCT declines are attributed to habitat loss, overfishing, competition and genetic introgression (Rieman and Apperson 1989; Van Eimeren 1996). In Montana, competition and hybridization with introduced exotic species are thought to be the major causes of decline, with habitat degradation and angling also playing a role (Likenss and Graham 1988; Van Eimeren 1996; Shepard, pers. comm. 1996). In Oregon, the main reason for the decline of WCT populations is introduction of non-native fishes, as well as environmental impacts from logging, grazing, agriculture, irrigation and dam construction (Draft 1994 Biennial Report on the Status of Wild Fish in Oregon and the Implementation of Fish Conservation Policies; Van Eimeren 1996).

There is evidence that some factors may act synergistically to increase the threats to WCT. Habitat degradation may exacerbate problems of competition and hybridization (Shepard, pers. comm. 1996). **The importance of mortality related to fishing, predation, or competition with introduced species may increase sharply when habitats have become degraded (Rieman and McIntyre 1993, USFS/BLM 1996c).** Displacement of WCT by introduced brook and brown trout has most often occurred in conjunction with habitat degradation that has apparently made waters more suitable for the non-native fish (Leary, et al. 1990). Brook trout and perhaps other introduced salmonids simply may have replaced WCT populations that have been depressed by other factors, such as high fishing pressure or habitat degradation (Griffith 1988; Liknes and Graham 1988). Angling restrictions have been less successful in recovering WCT populations where habitat has been degraded (Rieman and Apperson 1989; McIntyre and Rieman 1995). When land-use activities impact fish habitat, native WCT are less able to overcome the incursion of non-native fishes, such as brook, rainbow, Yellowstone cutthroat, and lake trouts, and kokanee salmon. The resulting competition leads to the disappearance or hybridization of pure native WCT. However, WCT can sometimes disappear from pristine habitats if non-natives are present. (Van Eimeren, pers. comm. 1996).

Petitioners address below each of the listing factors applicable to the WCT throughout its range. Without federal protection under the ESA, the WCT is likely to become endangered within the foreseeable future as a result of: the depressed status of most extant populations; the extreme curtailment and fragmentation of its range; the loss of adfluvial and fluvial forms and isolation of resident populations; and the ongoing exposure of virtually all remaining populations to habitat degradation, hybridization, competition, and the other factors that have contributed to the historic declines of the species. Belated State and foreign efforts to protect the species do not or cannot adequately address these major causes of decline and may themselves exacerbate the threats to the species. For these reasons, protection of the WCT as a threatened species under the ESA is warranted and necessary.

I. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range.

WCT are sensitive to changes in habitat due to land use practices (Ireland 1993). Because of this, the species has suffered throughout its range (Rieman and Apperson 1989). Intensive management has degraded the environment to such an extent that many waters are now unsuitable for WCT (Leary, et al. 1990). Disturbance of stream banks and riparian areas, construction of roads, and timber harvesting are associated with alteration of stream flows, increased erosion and sediment loads, and increased temperatures, all of which are detrimental to WCT survival and production (McIntyre and Rieman 1995).

Biologists in Montana and Idaho believe habitat degradation is one of the most important causes of decline throughout the WCT's range (Rieman and Apperson 1989). In the Flathead Basin of Montana, forest management activities have significantly affected streambed composition and fish populations (Weaver and Fraley 1991). In Idaho, habitat loss was the most important factor identified for WCT declines in 87% of the reaches, and the distribution of strong WCT populations is closely associated with roadless and wilderness areas (Rieman and Apperson 1989, Huntington 1996). Throughout the WCT's range, forest management, including timber harvesting, road construction, mining, and grazing, is viewed as the major contributor to habitat degradation (Rieman and Apperson 1989; Van Eimeren 1996b).

A. Sedimentation

The geology, climate, and vegetation of a watershed defines its sediment yield, which varies from year to year. Management activities, such as road construction, logging, grazing, and mining, disturb the watershed's natural processes and cause increased sediment yields over the natural rate. It takes decades for the effects of vegetative disruption to stabilize and for revegetation to occur so that sediment yields decrease from peak levels following disturbance. Road building and mining in particular have persistent impacts and increase baseline sediment yields for as long as the feature is present on the landscape (Stowell et al. 1983). Even after the terrestrial landscape has stabilized, it can take years or decades for a stream to flush out elevated levels of substrate sediment.

The negative influence of elevated fine sediment levels on WCT is widespread (Rieman and Apperson 1989; McIntyre and Rieman 1995). According to numerous studies, there is a substantial reduction in embryo, incubation, and emergence survival with increased levels of fine sediment (Irving and Bjornn 1984; Weaver and Farley 1991; McIntyre and Rieman 1995). When gravels become clogged by fine sediment, water flow through the redd is impeded, reducing the supply of dissolved oxygen to the embryo and the removal of metabolic wastes and causing mortality (Behnke 1992). A decline in embryo survival reduces the resilience of the population and leads to either an immediate population decline or to a less productive population vulnerable to other losses (Rieman and Apperson 1989). The number of WCT observed in snorkeling surveys in the South Fork Salmon River, Idaho, was negatively correlated with measures of substrate embeddedness (Thurow 1987; McIntyre and Rieman 1995).

Elevated sediment levels also negatively affect food and space for rearing juveniles (Bjornn et al. 1977; McIntyre and Rieman 1995). Highly embedded substrates are harmful for juvenile WCT that enter the substrate for cover in the winter (McIntyre and Rieman 1995). Porous substrate of a size allowing fish to move in and out is an important habitat component (Rieman and Apperson 1989).

WCT are also strongly associated with pools (Shepard 1983; Peters 1988; Hoelscher and Bjornn 1989; Ireland 1993; McIntyre and Rieman 1995). Larger fish congregate in pools during the winter (Peters 1988; Lewynsky 1986; McIntyre and Rieman 1995), and the juvenile carrying capacity of a pool is negatively correlated to the degree of gravel embeddedness (Chapman and Bjornn 1969; Klamt 1976; Bjornn et al. 1977; Irving et al. 1983; Rieman and Apperson 1989). Extensive migrations occur to find high quality pools for over-wintering and spawning and rearing habitat (Bjornn and Liknes 1986; Liknes and Graham 1988; Peters 1988; Rieman and Apperson 1989). By contrast, WCT may reside year-long where summer habitat and high quality pools are found together (Peters 1988; Rieman and Apperson 1989). Management practices, such as logging, grazing, and road-building, have increased sediment loads and significantly reduced pool volume throughout the WCT's range.

Management practices such as logging and road-building also increase coarse sediment yields, causing problems of excessive bedload transport and scour (Rieman and Apperson 1989; DICRB 1995). In low gradient reaches, bed aggradation results in the loss of pools or pool volume, and in channel dewatering during periods of low flows (Rieman and Apperson 1989; DICRB 1995; Lee, et al. 1996; Corsi, pers. comm. 1996). In watersheds within the belt geologies of northern Idaho and western Montana, excessive bedload transport and scour are problems associated with watershed disruption and increased peak flow events (Lee, et al. 1996). Bedload deposition in Idaho has produced porous and elevated channels resulting in subsurface flow and dewatered habitat, either eliminating WCT habitat entirely or blocking fish movements (Rieman and Apperson 1989). This is the most significant factor impacting WCT in the Coeur d'Alene and St. Joe River systems in Idaho (Corsi, pers. comm. 1996). Bedload transport is identified by the Montana River Information System as a limiting factor for fish habitat in numerous WCT-bearing watersheds.

B. Logging and Roadbuilding

In testing the effects of timber management on stream water quality, Hauer and Blum (1991) concluded that moderate and high activity watersheds in the Flathead basin had significantly higher suspended sediment and phosphorus and nitrogen concentrations than similar watersheds with low or no activity. Harvesting activities such as roadbuilding, felling, yarding, and burning have profound, long-term effects on watershed hydrology, streamflow, downstream lakes, and fisheries habitat (Hauer and Blum 1991).

Logging significantly affects spawning habitat of WCT. WCT spawning streams are often small and may be ephemeral or intermittent in flow, and logging plans typically have not provided buffers or protection for these small streams (Rieman and Apperson 1989).

Timber harvesting also reduces the amount of large woody debris (LWD) available to create fish habitat in streams. LWD is an essential part of WCT habitat and is important to stream stability and creation of pools (Rieman and Apperson 1989). Removal of timber from the riparian area has severely limited the woody debris available for future habitat needs as existing debris rots and washes away. The result is a long-term cumulative loss of pools and cover, both of which are important habitat components for WCT. Such changes in stream composition also may create habitat more suitable for other species of fish which then outcompete WCT. Researchers from the Montana Department of Fish, Wildlife and Parks found that clearcutting streams without a buffer strip was followed by a shift from cutthroat to brook trout dominance because the changes in stream habitat favored brook trout (as cited in Rieman and Apperson 1989).

Logging has been extensive throughout the WCT's range and has contributed to the widespread increases in fine and substrate sediment, changes in stream temperatures, structure and flows, and loss of pool volume described in the current status section above. Logging continues at a high level throughout most of the WCT's currently occupied range at the present time. Numerous sales are planned or being implemented in roadless areas which harbor many of the last remaining strong, genetically pure populations of WCT.

Following is a partial list of recent and planned Forest Service timber sales that are likely to adversely affect remnant WCT populations. The Forest Service generally acknowledges that these sales will have adverse impacts on individual WCT or habitat. However, because the Forest Service has not considered the cumulative effects of the sales in the project environmental assessments or elsewhere, the agency incorrectly concludes that the logging will not cause a loss of viability of the WCT.

1. Lolo National Forest

The Lolo National Forest in Montana has planned a number of timber sales in WCT watersheds, including the Cave Point, Rivulet, and Moccasin sales. For example, the Cool Bear project will contribute additional sediment to Fishtrap Creek, a WCT-bearing stream that is already water quality limited for sediment. The Petty Creek timber sale will harvest 6.8 mmbf from 2,865 acres in an area where most streams contain WCT. The EA admits that the logging "may impact individuals or habitat" but nevertheless claims without further analysis or other support that the harm to local populations will not cause a loss of viability to the populations or species.

As another example, the Hinchwood-Clark project proposes logging in an area containing potentially pure WCT populations. Past removal of riparian trees, construction of streamside roads, and the resulting sediment input have resulted in a system that has poor water quality and fisheries habitat and is below its natural fisheries potential (Hinchwood EA). The proposed logging will increase erosion, sediment, and stream temperatures at worst and maintain existing inadequate conditions at best (Id.). In other words, the Forest Service acknowledges that at a minimum this sale will curtail or perhaps reverse the natural recovery processes that may be necessary for persistence in these WCT populations.

2. Bitterroot National Forest

The proposed Warm Springs project will increase sediment yields in all drainages where management activities take place. Warm Springs Creek, which contains both WCT and bull trout, is already water quality limited for cold water fisheries and biota.

The Fern Creek project includes units within the WCT-bearing Tin Cup Creek, Bunkhouse Creek, Little Tin Cup Creek, Spoon Creek, and McCoy Creek drainages. The project will cause direct increases in sediment, although the Forest Service anticipates an eventual net reduction in sediment yields due to associated restoration work. However, in other projects of this kind, the proposed restoration work often is not completed or is done poorly so that presumed benefits are never fully realized.

The Stevi West Timber Sale will harvest along McCalla, Big, Smith, Sweathouse, and Gash Creeks, all of which contain WCT, as well as bull trout. The forest claims that the project will have "no effect" on the WCT. The Bear project will harvest in the Skalkaho Creek and Sleeping Child Creek drainages.

The Camp Reimel Ecosystem Management Project log 3.9 MMBF from 1,200 acres of forest land and build 3.5 miles of road. Logging and roadbuilding are proposed within the roadless lands adjacent to the Tolan and Allan Mountain roadless areas. (Camp Reimel EA 1997). A forest plan amendment will institutionalize a higher open road density of almost 3 miles per square mile in two drainages. Pure WCT are found throughout the project area. In addition, the Lost Trail Pass Ski Expansion Project raises concern for potential increases in water yield.

3. Flathead National Forest

The Sheppard-Griffin Timber Sale will harvest 20 mmbf on 1,678 acres in the Sheppard and Griffin Creek drainages. The project will entail road crossings of WCT-occupied streams and will impact at least 27 acres of riparian habitat conservation areas. Sheppard and Griffin Creeks drain into Logan Creek, a WCT-bearing stream that is water quality limited for cold water fisheries and biota. Sheppard Creek also is designated water quality limited for cold water aquatic life; Griffin Creek is in similar condition but is not officially designated as a water quality limited segment (WQLS). Previous projects have harvested 38% of the affected watersheds and constructed 244.5 miles of roads. Although the project also calls for reconditioning or reclaiming approximately 110 miles of existing roads, the effects of this mitigation are questionable. Reconditioned roads are merely hardened to decrease erosion and reclaimed roads will not have their road prisms removed, recontoured or seeded. The project poses a severe threat to the isolated WCT population in the upper portion of the Logan Creek watershed. This is just one example of many projects planned by the Flathead National Forest that threaten native WCT populations.

4. Kootenai National Forest

Planned timber sales in watersheds containing pure or slightly hybridized WCT populations include McSutton Lodgepole Pine Salvage, Murphy, and Dunn Salvage. The Berray Mountain sale will log 816 acres, primarily in a roadless area, and build a permanent bridge over Bull River, a WQLS and WCT-bearing stream. The project analyses state that "proposed logging and associated activities may increase sediment, possibly filling spawning habitat of fisheries, particularly bull trout and westslope cutthroat trout," but nevertheless conclude without supporting analysis that the project is not likely to contribute to a loss of viability.

The Cedar Gulch project will harvest 2.1 mmbf on 177 acres in an area where pure WCT are already threatened by hybridization, competition, isolation, habitat degradation, and slow growth and low fecundity. The Fry Zim Salvage sale will harvest 36.8 mmbf on over 2600 acres with 3.5 miles of new roads and three stream crossings. According to the project analysis, WCT in the project area already are threatened by hybridization with redband and rainbow trout and the existing road network is a chronic source of sedimentation. The eight Upper Sunday timber sales will log 13.7 mmbf over 1,334 acres during the next six years. Past logging in the area contributed to the extirpation of WCT and bull trout in the lower portions of Sunday Creek, but the forest conducted no additional monitoring, surveying, or cumulative effects analysis before approving the new sales.

5. Helena National Forest

The Beaver-Dry timber sale is logging and constructing roads in both the Nevada Mountain and Crater Mountain Roadless Areas adjacent to the Scapegoat-Bob Marshall Wilderness complex. The sale area includes several WCT-occupied streams that flow into the Blackfoot River. The proposed Poorman timber sale will clearcut 1,450 acres of forest and construct 18 miles of roads in roadless drainages containing pure WCT.

The Poorman Project proposes to harvest approximately 14 MMBF on about 1700 acres of forest land and burn approximately 5,900 acres of forest and grass/shrub land within the Helena National Forest. 14 miles of new system road and 2 miles of temporary road are proposed. (Poorman Project DEIS 1997).

Harvesting and burning is proposed in the Poorman and Humbug drainages where WCT are found.

The Jericho Salvage Sale will construct roads in order to harvest approximately 1 MMBF from 179 acres in the Jericho Mountain Roadless Area. WCT are found throughout the project area.

6. Beaverhead National Forest

In January, 1997, the Beaverhead Forest proposed a massive series of projects over the 114,000 acres of Beaverhead Forest lands in the Tobacco Root Mountains. A series of individual "vegetative manipulation" projects are planned over the course of ten years. This includes burning over 18,000 acres of land an harvesting on over 5000 acres of Forest land. 38 miles of new temporary roads will be constructed and will last the life of the project - ten years. (Tobacco Roots EA 1997).

~~6.~~ **7.** Clearwater National Forest

The Fuzzy Bighorn sale area includes Orogrande Creek, a WQLS with a marginally viable WCT population affected by summer temperatures and sediment yields in excess of forest plan and state water quality standards, low quantity and quality of pools, and limited amounts of acting and potential woody debris (Fuzzy Bighorn EA 1995). The area is steep and prone to mass failure, and 60% of the treatment area has already been clearcut. The forest admits that additional sediment may be added to the stream by timber sale activities, but claims that there will be no net increse due to restoration work (Id.). Activities along Orogrande Creek also may exacerbate existing temperature and sediment problems downstream in the North Fork Clearwater (Id.).

The Fan Lunch project is within the Eldorado Creek drainage, a WQLS and WCT-bearing stream. The sale analysis lists sediment and temperature as pollutants caused by the project, but claims that impacts to WCT will be "insignificant or non-measureable." Both Fuzzy Bighorn and Fan Lunch are logging rider sales.

The proposed Musselshell project includes Musselshell and Lolo Creeks, two WCT-bearing streams that are currently designated as WQLS and do not meet forest plan standards for temperature and sediment. Other Clearwater National Forest timber sales that pose high risk to affect WCT watersheds include the Cabin Country and White Sands projects.

The Dworshak Blowdown Salvage Sale will salvage harvest approximately 3mmbf of wind-damaged timber within the Salmon

Creek and Isabella/North Fork Clearwater River drainages, all of which contain WCT. (Dwarshak EA 1997). No new road construction is proposed. The project area lies primarily within the Salmon and Isabella Creek Watersheds with a portion that drains directly into the North Fork Clearwater River. The road #4800 crossing at Salmon Creek failed during a debris torrent in the spring of 1997. There is no feasible method to repair the crossing in time to facilitate the proposed harvest. This road is planned to be used during the proposed harvest, and logging would occur within the INFISH recommended RHCA. Logging would also occur within the recommended RHCA for the North Fork Clearwater River as well as for Isabella Creek. (Id.).

According to the North Lochsa Face DEIS, WCT can be found in almost all fish-bearing streams in the North Lochsa Face area. (North Lochsa Face DEIS 1997). The North Lochsa Face timber sale proposes to harvest up to 75mmbf from 6,790 acres of forest land and prescribe burn on 10,220 acres. Timber harvest would impact 1,650 acres and construct 1.1 miles of road within the North Lochsa Slope Roadless Area. One of the main limiting factors to fish production in many of the watersheds is the low quantity and quality of summer and winter rearing habitat. Walde, Upper Pete King, Upper Canyon, Mystery, and Apgar Creeks do not currently meet Forest Plan standards for sediment.

~~7.~~ **8.** Nez Perce National Forest

The Hungry-Mill Timber Sales FEIS (1996) proposes further logging along South Fork Clearwater tributaries that have been heavily impacted by past timber harvest. Over 50% of Deer Creek has been directly affected by past timber harvest; there are 10 miles of roads in the 1,003 acre watershed, and the stream is considered to be at 50% of its habitat potential. The situation is similar in the 5,547 acre American Creek watershed. Twenty-one percent of the drainage has been harvested, and it contains 22 miles of logging roads. These impacts, in addition to cattle grazing, have resulted in a habitat rating of 60% of potential according to the Forest Service. Isolated WCT populations exist throughout the sale area, with the Black George Creek and Deer Creek populations perhaps the most vulnerable (Id.).

The Middle Fork EIS proposes logging on over 4,000 acres, primarily within an inventoried roadless area, WQLS drainages, and landslide prone areas. According to a 1989 survey --the most recent performed --WCT are located in at least two of the affected drainages, the Middle Fork of the Clearwater and Unnamed Drainage #6. The forest again generically determined that the sales may impact individuals or habitat, but will not affect viability.

The Project 806 timber sale is proposed for the South Fork Clearwater River Basin. The project area contains Leggett Creek, Fall Creek, Station Creek, Reed Creek, Browns Creek, Harmon Creek and several unnamed tributaries, all of which drain directly into the South Fork. This project will harvest approximately 5.5 mmbf from 833 acres. (Project 806 Decision Notice and Finding of No Significant Impact July 1997).

The Chicken Nugget timber sale will harvest approximately 910 thousand board feet of timber on approximately 110 acres. WCT are found throughout the project area, where their habitat is significantly degraded. All of the watersheds in the project area are below Forest Plan objectives. Four streams, Newsome, Bear, Beaver, and Nugget Creeks, are all WQLS, listing sediment as the pollutant of concern. (Chicken Nugget EA 1997).

~~8.~~ **9.** Idaho Panhandle National Forests

Timber harvest activities, associated road building, and past instream debris removal have resulted in stream channel instability due to changes in runoff patterns and bedload sediment displacement in large portions of the forest (Horizon Forest Resource Area FEIS 1991). Logging rider salvage sales proposed for the North Fork Coeur d'Alene River drainage will exacerbate existing sediment and flow problems for WCT in the area.

C. Grazing

The detrimental impacts of grazing on riparian areas and stream health is well-established. Loss of stream-side vegetation can lead to increased summer temperatures, sedimentation, and bank instability. Bank instability reduces the availability of lateral habitat and pools by shallowing and widening streams (Moore and Gregory 1988). The availability of spawning gravels and selection of spawning sites often occur in or near lateral habitats, and they are important in cutthroat early life history (Id.).

Survival rates of WCT, which prefer colder temperatures, are greatly reduced by increased summer stream temperatures associated with grazing. In addition, loss of riparian vegetation can result in super-cooling of streams during the winter (Corsi, pers. comm. 1996). According to numerous studies, trout populations increased dramatically after removal of livestock grazing (Fleischner 1994). In Idaho, more abundant, larger fish were present after removal of livestock (Keller and Burnham 1982; Fleischner 1994).

In the Lolo National Forest, grazing was identified as one of the key reasons that fishery habitat was below potential and water quality did not meet state standards (Hinchwood EA).

Grazing also has been identified as a significant factor in WCT declines in the Upper Clark Fork, Bitterroot, Dodge Creek, South Fork Salmon, Middle Fork Salmon; South Fork Clearwater, Wolf Lodge Creek, and North Fork John Day River drainages (MRIS; Warm Springs EA 1996; Fern Creek EA 1996; Compartment 4 EA 1994; Upper SFSR and Johnson Creek Watershed Analysis 1995; Larkin, pers. comm. 1995; Hungry-Mill FEIS 1996; Horizon 1991). The Forest Service and BLM consider livestock grazing one of the primary threats to remaining WCT populations in the upper Missouri River Basin (USFS/BLM 1996).

D. Dams

Dams have significantly affected a substantial amount of WCT habitat by blocking migration routes and access to habitat and altering flow conditions and stream composition. Perhaps the most significant effects have been on fluvial and adfluvial populations (DICRB 1995; McIntyre and Rieman 1995). Whole river basins have been blocked, including the Pend Oreille River, Swan River, and South Fork Flathead River (McIntyre and Rieman 1995). The isolation of populations and the curtailment of migratory life-history forms threatens the long-term survival of the species (Id.).

Flow and temperature regulation in the Kootenai River following construction of the Libby Dam created conditions more suitable for rainbow trout, allowing them to replace the native WCT (Chapman and May 1986; Rieman and Apperson 1989). Cabinet Gorge Dam on the Clark Fork River, above Lake Pend Oreille, eliminated access to over 90% of the historical spawning and rearing habitat once available to adfluvial fish (Rieman and Apperson 1989; Lee, et al. 1996). The Milltown and Montana Power Dams and Dworshak Dam blocked spawning migrations and eliminated access to substantial stretches of habitat in the Clark Fork and North Fork Clearwater Rivers, respectively.

Within the Interior Columbia River Basin, and portions of the Klamath and Great Basins within Oregon (the assessment area of the Aquatic Riparian Staff Area Report for the Interior Columbia Basin Ecosystem Management Project), there are at least 1,239 dams with storage capacity in excess of 62,000 m3 (Lee, et al. 1996). Because federal inventory and inspection includes required only larger dams and those with downstream hazard potential, the exact number of dams in the assessment area is unknown. For example, 74% of 1,600 dams identified in eastern Oregon have less than 62,000 m3 capacities (Id.). The National Research Council found that most of the small dams in the assessment area do not have fish passage facilities (Id.). The extent to which these dams impede migration and affect spawning and rearing habitats of WCT has not been documented (Id.).

E. Irrigation

Over 3600 miles of streams in Montana are de-watered each year. The blue ribbon West Fork of the Gallatin River has been dried up by irrigators, and the Big Hole River was reduced to a series of disconnected pools in 1994.

Irrigation diversions, like dams, serve as migration barriers that have isolated or eliminated areas of WCT habitat that were once available to migratory populations (DICRB 1995). Dewatering caused by irrigation withdrawals has played a significant role in fragmenting and isolating resident populations in the Upper Missouri, Blackfoot, Bitterroot, and John Day River systems.

According to Bob Smith, fisheries biologist for the Salmon-Challis National Forest in Idaho, irrigation diversions have played a significant role in dewatering tributary streams and creating barriers to higher reaches in numerous drainages (Smith, pers. comm. 1996). There are 500-550 irrigation drainages in the upper Salmon River drainage alone (Id.). These diversions have contributed substantially to transforming the WCT's habitat from one large interconnected system to a series of small, disconnected streams separated by periodicalloy dewatered segments (Id.). According to Smith, this is one of the main reasons for the decline of WCT (Id.).

F. Mining

Toxic metal contamination and stream diversions caused by mining pose an enormous threat to WCT populations. Many mines are poorly operated and tailings ponds often fail, sending highly contaminated sediment into the watershed. Contamination alters the chemical balance of the water making it uninhabitable. Huge fish kills result from the discharge of the mining-related toxins, often occurring after heavy rains wash chemicals and mining wastes into the streams and their groundwater sources.

In Idaho, mining activities are thought to have introduced large amounts of fine sediment to some streams (Thurow 1987). Historic mining within the Coeur d'Alene Basin has created one of the nation's largest Superfund sites and given rise to severe impacts on WCT (Corsi, pers. comm. 1996). WCT also are adversely affected by very high levels of toxic mine tailings associated with the Butte mine, the Mike Horse mine and other facilities within certain reaches of the Clark Fork and Blackfoot River systems. There are over 6000 abandoned mine sites in Montana as a whole, many of which are on public lands and a number of which pose continuing threats to water quality in WCT-bearing streams. (Pacific Rivers Council 1995).

On the Helena National Forest in Montana, degraded habitats west of the Continental Divide have been affected primarily by mining (Helena National Forest Oil and Gas Leasing EIS, Biological Assessment 1993). Placer mining has had significant effects on water quantity and quality, streambeds, and riparian habitat in WCT streams within the Blackfoot drainage and the Big Belt Mountains. On the Beaverhead National Forest, mining has significantly affected WCT populations (Oil and Gas Leasing DEIS 1994). The forest is proposing to open up 99.5% of its available lands to oil and gas leasing (Id.), and recently approved gold exploration plans for 300 drill sites and 17 miles of new roads in the Elkhorn Wildlife Management Unit. Other proposed mining projects that would adversely affect WCT habitat include the

McDonald gold mine and Big Blackfoot mine in the Blackfoot drainage and the ASARCO Rock Creek mine.

II. Overutilization

Recreational fishing has played a significant role in the decline of WCT in substantial portions of its range. In Idaho, overfishing has contributed to an estimated 47% of the decline in WCT populations (Reiman and Apperson 1989). Overfishing was probably a contributing factor to the elimination of WCT populations in the Bitterroot valley and may be a limiting factor for the remnant population in lower Dodge Creek.

WCT are substantially more vulnerable to angling than rainbow, brook, and brown trout in the same stream because they rise more readily to most baits (MacPhee 1966; Lewynsky 1986; Rieman and Apperson 1989). Angling pressures of no more than 30 to 40 hours per hectare per year are likely to overexploit westslope populations in a stream (Behnke 1992). Rieman and Apperson (1989) found evidence of a depensatory effect in fishing -mortality increases with decline in population size -and speculated that overharvest could lead to the elimination of some small populations. Contributing to the risk is an angler preference for WCT. Anglers find an intrinsic value in "native" or "wild" cutthroat trout, and it was recognized as one of the three most preferred species in a recent Idaho angler survey (Reid 1989; Rieman and Apperson 1989).

WCT can respond rapidly to protective angling regulations with a dramatic increase in abundance and survival of older, larger fish (Bjornn and Johnson 1978; Behnke 1992). However, decreased resilience due to habitat destruction make the WCT more vulnerable to exploitation and less likely to respond to angling restrictions (Rieman and Apperson 1989). A loss of resilience could explain the failure of special regulations to recover populations in Priest Lake, Hayden Lake, the Coeur d'Alene River, and the South Fork Salmon River in Idaho (Id.; McIntyre and

Rieman 1995). All of these drainages suffer from significant habitat degradation. Noncompliance with the angling regulations, harvest during other portions of the life history, or stress caused by catch-and-release angling also may have contributed to the failure in the Coeur d'Alene River (McIntyre and Rieman 1995). Drainages in Idaho that have experienced successful recoveries are, at least partially, located in wilderness or undeveloped areas where WCT habitat has been least impacted by management activities. These drainages include the Upper St. Joe River, Kelly Creek, Selway River (tributaries to Clearwater River) and Big Creek (tributary to the Middle Fork Salmon River) (Rieman and Apperson 1989).

In Montana, a catch and release program has been implemented in most headwater streams of the Missouri River drainage. Throughout the rest of Montana and Idaho, there are a mix of bag and size limits and catch-and-release regulations. There is no credible assessment of the population effects of the present harvest regulations in Montana (C. Frissell, Flathead Biological Station, pers. comm. 1997).

In Washington, wild cutthroat trout are catch-and-release only, while hatchery cutthroat may be possessed. Nevertheless, Washington Department of Fish and Wildlife officials speculate that harvest in highly accessible streams may be the greatest threat to WCT in Washington (Van Eimeren 1996). There are no WCT-specific angling regulations in Oregon. Fishing regulations applicable to the WCT are attached as Appendix C.

III. Disease or Predation

A. Predation and Competition with Non-Native Fish

Introductions of non-native species have contributed to the decline of WCT through competition, predation, and hybridization throughout their range. Brad Shepard, a MDFWP fisheries biologist, believes that introduction of non-native fishes is the primary reason for the decline of WCT in Montana, followed by land and water use (pers. comm. 1996). McIntyre and Rieman also conclude that competition and predation must be considered as a limiting factor in assessing WCT status (McIntyre and Rieman 1995). WCT are subject to competition and predation by introduced salmonids, including rainbow, brook, brown, and lake trout and kokanee, and many other introduced warm-water fishes, including northern pike and yellow perch (MDFWP Draft Management Plan for Warmwater Fisheries 1996).

Displacement of WCT through competition with and predation by non-native fishes has most often occurred in conjunction with habitat degradation which has made the waters more suitable for the existence of the introduced fish (Leary, et al. 1990). For example, in the Gallatin National Forest, WCT abundance declined in degraded reaches where other species were present (Ireland 1993). Where habitat degradation is coupled with introduction or presence of brook trout, WCT survival is in jeopardy (Van Eimeren, pers. comm. 1995). However, where there are no brook trout, WCT may be present even in high-gradient degraded streams (Id.). Today, WCT exist in high-elevation, headwater reaches where they may have a competitive advantage over introduced salmonids (Fausch 1989; Ireland 1993).

According to Dave Kampwerth, fisheries biologist for the BLM, brook trout is the main reason for the disappearance of WCT from recently surveyed streams. Habitat degredation is also a concern because in plays a role in brook trout becoming dominant. Degraded habitat enables the brook trout to thrive, while diminishing the ability of the WCT to compete. Under normal conditions, WCT have a 30% chance of egg survival, while brook trout have a 40% chance. If habitat is degraded, WCT egg survival declines very rapidly while brook trout egg survival declines more slowly. Even under good habitat conditions brook trout would wipe out WCT. (Kampwerth pers. comm. 1997).

In Washington, cold water temperatures below hanging valleys in the West Fork Methow River are believed to favor WCT over competing species (DHCA for WCT 1995). By contrast, elevated water temperatures may play an important role in the displacement of native WCT and bull trout by rainbow trout in tributaries of the Methow River (McIntyre and Rieman 1995).

WCT do not compete well for food and space with other trout and may often be out-competed by introduced non-native fish (Behnke 1992; McIntyre and Rieman 1995). Competition in lakes from introduced kokanee, lake trout, and yellow perch, along with degradation of spawning areas, has reduced westslope populations in all large lakes in Idaho and Montana (Trotter 1987). Competition with introduced brook and brown trout has caused the displacement of many WCT populations from their native streams (Liknes and Graham 1988; Leary et al. 1990). Native WCT have been largely replaced by introduced brown trout in all the blue ribbon streams of the Missouri River drainage, and eastern brook trout have replaced them in so many small streams that it is now the most common fish in the headwater creeks and beaver ponds (Trotter 1987). Brook trout may actively displace WCT, or may replace a WCT population depressed by other factors (Griffith 1972).

WCT are preyed upon by other fish (McIntyre and Rieman 1995; Behnke 1992; Rieman and Apperson 1989). Lake trout is an effective predator of cutthroat trout (Behnke 1992). WCT have been identified in stomachs of bull trout, lake trout, and sculpins (Beach 1971; Athern 1973; Mauser 1986; McIntyre and

Rieman 1995). Predation can be an important source of mortality, particularly in altered or overexploited populations (Rieman and Apperson 1989). Predation may make recovery extremely difficult or impossible (Id).

In Glacier National Park declines of WCT populations in many lakes may be related to predation or competition by introduced species (Marnell 1988). Kokanee and WCT apparently compete for zooplankton, and WCT are preyed upon by the highly piscivorous lake trout (Marnell 1988).

The MDFWP Draft Management Plan for Warmwater Fisheries recognizes and summarizes the widespread threat to WCT from predation by northern pike and other warmwater fishes (MDFWP 1996). The plan, however, does little to resolve this conflict. The plan calls for enhancement of northern pike numbers and size in many areas where conflicts currently exist, including the Flathead River Sloughs and Lower Stillwater Lake. In other areas, including Upper Stillwater Lake, Swan Lake, Whitefish Lake, Placid Lake, and the Clearwater Chain of Lakes, the plan calls for a balance between maintenance/enhancement of the warmwater fishery and protection of native trout, but offers no guidelines to achieve this balance and sets no minimum thresholds for monitoring plans for trout populations to alert managers when corrective action must be taken (Id.). Attempts to stock Bull Lake with WCT have failed due to predation from and competition with both kokanee and warmwater species such as perch (Id.). MDFWP provides no data, analysis or assessment to justify the plan's assumption that warmwater fisheries can be maintained or enhanced consistent with the preservation of WCT populations.

Predation may also occur by piscivores other than fish. For example, birds such as mergansers, kingfishers and harlequin ducks have varying utilization levels of cutthroat trout, most probably on juveniles. River otters and other non-avifauna also predate on WCT, although to what extent is undetermined in the scientific literature.

B. Whirling Disease

According to Governor Marc Racicot's Whirling Disease Task Force, "whirling disease is the most significant threat to the survival of wild, naturally reproducing trout populations in Montana" (MDFWP Annual Report 1995). Whirling disease has been found in trout streams in Montana, Idaho, Oregon, and Washington. The initial detections in many states have been in hatchery fish, and hatchery fish and operations may be partly responsible for spread of the disease. WCT are closely related to rainbow trout, which are highly susceptible to the disease.

In Montana, whirling disease has been found in ~~29~~ **55** locations, including streams in the Madison, Jefferson, Clark Fork, Beaverhead, Swan, ~~and~~ Ruby**, Missouri, Big Hole and Rock Creek** drainages.**(MFWP 1997) (See Appendix U-7)** ~~Most recently~~, **Recently,** rainbow trout in Little Prickly Pear Creek, a tributary of the Missouri River, have tested positive for whirling disease. (Bozeman Daily Chronicle, p. 6, 7/21/96). Whirling disease is responsible for a 90% decline in the Madison River rainbow trout population in just three years. "The task force believes that whirling disease is likely, over time, to spread to every major river drainage in Montana where both trout and the parasite's alternative host -small, stream-dwelling worms -are found" (MDFWP Annual Report 1995).

While there are no documented cases of whirling disease in wild WCT in Montana, WCT have been infected with the disease in field experiments and appear very non-resistant, with a rate of infection of 92.3% in one particular study (Vincent 1997). In a second field study where WCT were put in cages in streams known to contain the whirling disease parasite, *Myxobolus cerebalis*, WCT became infected (MacConnell 1997).

The life history of WCT, however, may afford them some protection because young trout, which are more vulnerable to the disease, tend to stay in high tributaries which are poor habitat for the parasite's tubifex worm host. Dick Vincent of MDFWP, head of the Whirling Disease Task Force, reports that the state is presently testing for the disease in wild WCT and suspects it will be a problem because WCT are so closely related to rainbow trout (Vincent, pers. comm. 1996).

In fact, a recent study indicates that WCT are highly susceptible to whirling disease (*Myxobolus cerebralis)* - they are only slightly less susceptible than rainbow trout. (McDowell et al.). Black tails were seen in the high dose group 6 weeks post exposure. At the end of the study, 60% of the high dose group showed black tail and 20% were whirling. Histological examination of rainbow trout and WCT 2 months post exposure showed similar infection rates and microscopic lesions associated with parasite and these were rated moderate in WCT and moderately severe in rainbow trout. In the low dose groups, only one rainbow trout was infected and all WCT examined were negative for the parasite. By 5 months post exposure, WCT showed mostly mild to moderately severe cranial lesions and few lesions in gill or jaw cartilage.

Water temperature, fish species, dose, and age of exposure are critical factors in the progression of infection and development of whirling disease. (Id.).

In Idaho, the whirling disease parasite has been found in WCT in **13 drainages, including the Coeur d'Alene River drainage, South Fork Clearwater**

Drainage, and Upper Salmon River drainage.(Elle, pers. Comm. 1997) (See Appendix U-8). In addition, the parasite has been found in the Middle Fork Salmon River. (Hutchinson, pers. comm. 1996). According to Doug Berton, fisheries biologist at the IDFG Fish Health Lab, the whirling disease parasite has been found in spores by digestion in the Middle Fork Salmon River. While the parasite has not been officially confirmed, he would be surprised if it is not there (Berton, IDFG, pers. comm. 7/23/96). Whirling disease has been in the upper drainage for a few years, and has been found in almost all native salmonids (Berton, pers. comm. 1996). The whirling disease parasite is widespread throughout Idaho and the

primary vector have been four hatcheries that have tested positive for the disease (Elle 1997).

Whirling disease has been detected in salmon and hatchery steelhead in northeastern Oregon. (B.Hooton, ODFW, pers. comm. 1996). Whirling disease has not been detected in the John Day River basin (T. Unterwegner, ODFW, pers. comm. 1995), but there is a risk that steelhead infected with the disease may stray into presently unaffected waters.

In November, 1996, the Washington Department of Fish and Wildlife confirmed the presence of whirling disease in wild steelhead in the lower Grande Ronde River drainage (Lorz et al. 1989), a tributary of the Snake River. This was the first confirmed detection of whirling disease in Washington and in wild steelhead. There is currently no evidence of infection in WCT-bearing streams, but monitoring for whirling disease in Washington began only in October, 1996, and the extent of the disease in the state is not currently well known (Roberts 1997).

IV. Inadequacy of Existing Regulatory Mechanisms

Survival and recovery of WCT is threatened by the absence of a comprehensive conservation strategy to protect and restore aquatic ecosystems in the Columbia River Basin. Designation of the WCT as a federal category 2 species (presently a species of special concern/sensitive species) and as a sensitive species by the states has done little to curb the management practices that degrade water quality and WCT habitat. Federal and state laws designed to conserve fish resources or maintain water quality have not been sufficient to prevent past and ongoing habitat degradation and population fragmentation. Conservation measures in many federal regulations and management plans are merely advisory or contain multiple provisions for “exemptions” and few or no requirements for rigorous analysis and review by qualified experts. The Service recently found these laws and measures inadequate to protect bull trout from threat of extinction within the same general geographic area inhabited by the WCT; similarly, the National Marine Fisheries Service did not find these laws and measures adequate to protect freshwater habitat conditions for

Snake River sockeye, spring/summer chinook, and fall chinook.

According to a recent article in the Idaho Statesman, Idaho is failing to fulfill its promise to protect bull trout habitat. Internal documents from the Fish and Wildlife Service, the U.S. Forest Service and the Division of Environmental Quality show that state and federal agencies did not follow agreements designed to stop habitat destruction, and bull trout rivers have not shown signs of improvement. WCT and bull trout are often found in the same drainages. If federal and state agencies are not protecting bull trout habitat - and bull trout is a "proposed species" - than they are also failing to protect WCT habitat. (Idaho Statesman, Oct. 26, 1997).

A. Existing Federal Land and Resource Management Plans.

According to the Integrated Scientific Assessment for Ecosystem Management in the Interior Columbia Basin (Quigley, et al. 1996), existing land management plans will not conserve strong populations, prevent further declines, or rebuild depressed populations of WCT. This assessment confirms what is clear from the current precarious state of the WCT: a new management regime based on a landscape-level reserve system and active habitat restoration and reconnection is necessary to recover the WCT.

Existing Forest Service and BLM land and resource management plans do not preclude road construction, logging, grazing, and mining in drainages containing remnant WCT populations. Roadless areas -which are closely associated with the last strongholds of WCT populations -are generally not protected from human disturbance with the exception of a limited number of wilderness areas and wilderness study areas. To the contrary, many roadless areas containing WCT are scheduled for major road building and logging projects within the next few years. Standards and guidelines for riparian and aquatic habitat protection have not been sufficient to prevent population declines and fragmentation of the WCT's habitat. As described above, the agencies continue to approve logging, road building, grazing, and other activities in drainages that are known to be below plan standards for water quality, riparian condition, and fisheries goals.

The existing management plans do not include the elements necessary to halt and reverse the decline and extirpation of remnant WCT populations. The plans do not set aside secure refugia for healthy WCT populations or establish a network of protected habitats to reconnect isolated populations. The plans do not require restoration projects to eliminate existing threats to WCT habitat, such as obliterating roads and stabilizing logged, landslide-prone slopes. Without an affirmative landscape-level strategy to protect, restore, and reconnect quality WCT habitats, the risks of continuing incremental local extirpation and eventual rangewide extinction remain high.

B. INFISH/PACFISH

While INFISH and PACFISH are steps in the right direction, these interim strategies are inadequate to protect or lead to the recovery of the WCT. INFISH restrictions are temporary, do not apply to non-Forest Service lands containing WCT populations, and do not apply to Forest Service lands outside the Columbia River Basin that contain WCT, including national forests in the Greater Yellowstone Ecosystem and the Missouri River Basin. PACFISH suffers from similar temporal and jurisdictional shortcomings.

In addition, INFISH and PACFISH restrict land use activities only within relatively narrow Riparian Habitat Conservation Areas, which comprise approximately one-quarter of the Forest Service lands encompassed by the strategies. The strategies ignore the water quality and habitat stresses arising from uplands activities and fail to address the needs of WCT within a watershed context. They do not change the land allocations in the pre-existing plans, do not prevent entry into roadless or undeveloped areas, and do not initiate restoration measures for currently degraded habitats. They also do not provide specific direction to reduce the damage caused by ongoing grazing and mining activities. INFISH and PACFISH also do not address threats from exotic species and overfishing, which are state responsibilities.

INFISH and PACFISH provide marginally stronger protections for priority watersheds, but these watersheds were designated with a priority on bull trout populations and critical habitat for listed anadromous species, respectively. Priority watersheds under INFISH and PACFISH do not reflect and were not intended to reflect, the habitat needs of WCT. In addition, logging and other habitat disturbances are still permitted in these watersheds, such as the Cool Bear project in the Fishtrap watershed in the Lolo National Forest.

Finally, INFISH and PACFISH provide for numerous exceptions to, and modifications of, the protections they do afford. There are presently numerous management activities, such as logging, grazing, and mining, planned in WCT watersheds in forests that have adopted the INFISH and PACFISH guidelines (USDA, USFS Region 1 INFISH Implementation Summary 1996). Inconsistent application of the strategies has exacerbated the effects of these loopholes (USFWS, Comments on ICBEMP PDEIS, 11/3/95). The Service has documented numerous instances in which the land management agencies have proposed entry into roadless areas, road construction in RHCAs, harvest in landslide-prone areas, and grazing without compliance with PACFISH and INFISH standards.

The Service also has found that watershed analyses performed under INFISH and PACFISH frequently "misapplied the scientific process and drew erroneous conclusions and made management recommendations likely to result in harm to clean water, fish, and wildlife." The use of flawed watershed analyses to justify management actions that degrade riparian and aquatic habitat, coupled with the limited geographic and temporal scope of INFISH and PACFISH, pose a continued threat to remnant WCT populations.

INFISH/PACFISH amended federal management plans only in the Columbia River Basin, as a result, populations of native fish on federal lands in the upper Missouri River basin have received no special protection. In the Upper Missouri, federal agencies have developed a short-term strategy. The Upper Missouri Westslope Cutthroat Trout Short Term Strategy was developed for the affected units in the basin of the US Forest Service and the Bureau of Land Management with the aid of the Montana Department of Fish Wildlife and Parks (MDFWP). This short-term strategy is intended to provide interim protection until a long-term strategy is completed which will supposedly be developed with MDFWP as the lead agency. The short-term strategy did not go through the public review process as required by the National Environmental Policy Act. As a result it does not amend Land and Resource Management Plans as do INFISH and PACFISH. In addition, for current and proposed activities, there are no standards and guidelines that are required by law to be adhered to for the protection of WCT.

C. Clean Water Act

The federal Clean Water Act does not establish an effective and enforceable regulatory scheme to prevent the negative impacts of nonpoint sources of pollution. Voluntary best management practices and state water quality standards have not been sufficient to prevent detrimental changes in water temperature, sediment loads, and substrate sediment in WCT streams. The Forest Service continues to authorize harmful timber sales, road construction, and stream crossings in streams that are designated under the Act as water quality limited for cold water fisheries and biota. In addition, the Act has not proven an effective mechanism for addressing persistent threats to water quality, such as toxic leachate from abandoned mine sites.

There are many stream segments within the historic range of WCT that currently are threatened or do not fully meet clean water standards. These are required to be listed by the states under Section 303(d) of the Clean Water Act. Section 303(d) stream segments and lakes are those that do not fully support their beneficial uses, such as cold water fisheries and aquatic life support.

The states of Idaho, Montana, Oregon and Washington have primary authority to develop programs to assess impaired waterbodies and to develop Total Maximum Daily Loads (TMDLs) for pollutants so that Section 303(d) degraded waters are restored. The states report biennially their findings of water quality limited streams and lakes after completing assessments. To date, these four states have not fully assessed all of their waterbodies. Of those that have been assessed, within WCT range, many miles of streams have been found to be impaired.

For example, in the upper Missouri River basin where only 144 WCT populations with genetic purity greater than or equal to 90% remain on federal lands, approximately 70 of these populations are in or adjacent to water quality limited stream segments (WQLSs) as reported in the 1994 Montana 305(b) Water Quality Report (See Appendix K). Thus, water quality in and near these existing populations is threatening the existence of the populations or limiting available habitat for population expansion. At this time, the state of Montana has not scheduled nor implemented TMDLs for any of these stream segments.

In areas outside the Missouri River Basin, there exist thousands of miles of stream segments throughout the range of WCT that currently do not meet clean water standards nor fully support their beneficial uses.

For example, the 1994 Oregon Water Quality Status Assessment Report lists 1355 miles of water quality limited segments in the John Day River Basin. Although existing information does not allow a comparison of the water quality limited segments and the WCT's current range, the extent of the degradation demonstrates the inadequacy of the Clean Water Act and its implementation as a regulatory mechanism to conserve the WCT in the John Day basin.

<u>John Day River</u>

Miles Partially Supporting	450.00 miles
Miles Not Supporting	905.00 miles
Total Miles of Impaired Streams	1355.00 miles

In the 1994 Idaho Water Quality Status Report, the following summary, by basin, in historic and current WCT range lists the following WQLSs although mileage was not indicated in the report. There were over 447 stream segments that were impaired in these three basins.

<u>Clearwater River Basin</u>

163 streams impaired within the Basin

<u>Panhandle River Basin</u>

149 streams impaired within the Basin

<u>Salmon River Basin</u>

135 streams impaired within the Basin

In the Montana 1994 Water Quality Report, the following miles of streams and acres of lakes, summarized by basin, are currently not fully supporting two beneficial uses directly related to WCT - cold water fisheries and aquatic life support (many of the streams and lakes are not fully supporting both uses):

Flathead River Basin	Streams	Lakes
Impaired Aquatic Life Support	320.20 miles	1520.00 Acres
Impaired Cold Water Fishery	359.31 miles	1520.00 Acres
Kootenai River Basin		
Impaired Aquatic Life Support	270.64 miles	28850.00 Acres
Impaired Cold Water Fisheries	383.54 miles	28850.00 Acres

Lower Clark Fork River Basin	Streams	Lakes
Impaired Aquatic Life Support	598.49 miles	
Impaired Cold Water Fishery	989.38 miles	
Upper Clark Fork River Basin		
Impaired Aquatic Life Support	1004.57 miles	5315.80 Acres
Impaired Cold Water Fishery	1325.41 miles	5315.80 Acres

Clean water, an important habitat component of WCT is currently not being maintained in thousands of miles of streams within its current and historic range. Similarly, many lakes are also impaired. The states have failed to schedule and implement pollution controls (mostly for nonpoint sources) for almost all of these waterbodies. A lack of clean water will persist throughout the current and historic range of WCT until TMDLs are developed and implemented. The Clean Water Act has inadequately protected WCT and their habitat.

V. Other Natural or Manmade Factors

A. Hybridization with Introduced Non-Native Species

Hybridization with non-native species, particularly rainbow and Yellowstone cutthroat trouts, is one of the most significant threats to the continued existence of WCT (Leary, et al. 1991). Hybridization has occurred throughout the WCT's range as the result of extensive introductions of non-native species beginning in the mid to late 1800s and continuing today. Hybridization with rainbow trout is widespread, and hybridization with Yellowstone cutthroat is a problem throughout most of the WCT's range (Rieman and Apperson 1989; McIntyre and Rieman 1995). Genetic introgression is likely to be widespread in any drainage where non-native trout have been introduced (Leary, et al. 1984). This introgression eliminates pure populations and influences performance and survival of the hybridized stock (Allendorf and Leary 1988; Rieman and Apperson 1989). Genetic introgression seems most prevalent in drainages where WCT have been depressed through other causes and introductions of other trout have persisted for some time (Rieman and Apperson 1989).

Harms from hybridization include loss of genetic variation through reduction in population size and loss of genetic integrity (Allendorf and Phelps 1980; Leary, et al. 1984; Allendorf and Leary 1988; McIntyre and Rieman 1995). Loss of genetic variation is a long-term risk in isolated or severely restricted populations of any species (Soule 1980; Gilpin and Soule 1986; McIntyre and Rieman 1995) and is generally expected to increase the probability of extinction (Allendorf and Leary 1988). Loss of variation may lead to poor performance (growth, survival, fertility, development) of individual stocks and greater susceptibility to epizootics and habitat disruption (Allendorf and Leary 1988; Rieman and Apperson 1989). Ultimately it can lead to loss of the characteristics that make WCT unique and to a loss of viability (Rieman and Apperson 1989). Conservation of a species depends on protection of its genetic diversity, and the consequence of losing diversity both within and among populations may be crucial to survival in highly variable environments (Rieman, et al. 1993).

Because genetic variation of WCT is low within populations but high among populations, maintenance of genetic diversity requires protecting the genetic integrity of many discrete populations (Leary, et al. 1985; Allendorf and Leary 1988; Rieman and Apperson 1989). However, hybridization has destroyed or compromised the genetic integrity of most native populations (Leary, et al. 1990).

B. Isolation and Fragmentation of Populations

The genetic threats described above are excerbated by the physical and reproductive isolation of most surviving WCT populations. Fragmentation of habitat and loss of gene flow among populations compromises their long-term persistence (Gilpin and Soule 1986; Hanski and Gilpin 1991; Rieman, et al. 1993; McIntyre and Rieman 1995). Effective conservation of the WCT requires the maintenance and restoration of well-connected "mosaics" of habitat (Frissell, et al. 1993; Rieman, et al. 1993; Rieman and McIntyre 1993; McIntyre and Rieman 1995).

A recent study of WCT and bull trout in the Clark Fork River

basin sums up the effects of isolation and fragmentation of WCT populations: Today, most of the WCT populations are small and fragmented, and the migratory life history has largely been lost. Interconnectedness of populations, the migratory life history, and population size are all components of a meta-population, which is essential to the long-term persistence of the WCT. "Meta-population refers to several discrete populations that interact. Interaction, in this case, means individuals disperse (migrate) between nearby nursery areas, and eventually spawn. The spawning may also result in recolonization of an area. In either case, *the interaction between populations reduces the risk of extinction*." (Pratt and Poff 1996).

The existence of meta-populations enables WCT to recolonize an area previously fragmented by habitat degradation. "Changes, whether temporary or chronic, in aquatic habitats can lead to population decline or localized extinction. Catastrophic events...might eliminate a fish population from a particular habitat. The cumulative degradation of many small changes in habitat also eliminates fish populations from a waterway, over time. In either event, the presence of other populations nearby creates an opportunity for recolonization when habitat conditions improve." (Pratt and Poff 1996).

"The risk of extinction increases as effective population size decreases. Separating interacting groups of populations into a new smaller organization of populations, decreases the effective population size. In the case of Lake Pend Oreille and the lower Clark Fork River, the physical obstructions in the river separate populations. Noxon Rapid Reservoir, Cabinet Gorge Reservoir and Lake Pend Oreille are three composite populations that were once a larger group of interacting populations." (Pratt and Poff 1996).

While fragmentation alone does not mean a population will go extinct, it does decrease the resiliency of the fragmented, isolated populations. Isolated populations of adfluvial WCT can exist for long periods. "When fragmentation isolates a small stream from a larger watershed, forming even smaller populations, extinction risk increases, but may not occur for many years. Populations may persist upstream from waterfalls (such as Vermillion Falls), despite isolation. Resident cutthroat trout often exist indefinitely as small isolated populations upstream from waterfalls." (Pratt and Poff 1996).

The isolation of WCT populations has both physical and biological causes. Physical blockages, including dams, severe habitat degradation of higher order streams, and dewatering of migratory channels, have contributed to the loss of migratory life history forms and limited WCT distribution to disconnected resident populations in headwaters streams. The disappearance of many migratory populations has limited genetic exchange among populations and reduced the possibility of recolonization in the event of local extirpations (Van Eimeren 1996; DHCA for WCT

1995). Isolation of individual populations has left them more vulnerable to the full range of factors affecting the species, including habitat degradation, natural catastrophes, overutilization, disease, competition, predation, and hybridization, as well as demographic and genetic threats peculiar to small populations, such as inbreeding depression and genetic drift.

In its 1994 Finding on a petition to list the bull trout, the Service recognized that "[p]ersistence of migratory life history forms and maintenance or reestablishment of stream migration corridors is crucial to the viability of bull trout populations." The restriction or elimination of these migratory forms was a significant factor in the determination that bull trout warranted listing as a threatened species.

As with bull trout, migratory life history forms are essential to permit genetic exchange among WCT populations and recolonization after local extirpations (Van Eimeren 1996). Also like bull trout, migratory forms have suffered the greatest declines among WCT populations (Id.). Adfluvial and fluvial populations have been eliminated or are significantly depressed in most of the major lakes and river systems in the WCT's range, including Flathead Lake, Pend Oreille Lake, Lake Chelan, the Bitterroot River, the Clark Fork, and parts of the Clearwater system.

The reproductive isolation and extirpation of individual populations has additional import with respect to the long-term survival and adaptability of westslope cutthroat trout because of the genetic structure of the subspecies. As Allendorf and Leary (1988) wrote: "[M]uch of the genetic variation within the westslope cutthroat trout results from alleles found in only one or two local populations, but they often occur at high frequencies in those populations. Thus, preserving the genetic variation in westslope cutthroat trout entails preserving as many local populations as possible." Loss of isolated populations poses a serious threat to the genetic integrity of the species as a whole.

C. Introduction of Hatchery Strains

A variety of hatchery programs have been used for over 50 years in attempts to enhance WCT populations and fisheries (Rieman and Apperson 1989). These programs have not been clearly successful, and survival in large lakes is poor. Hatchery programs cannot be used in place of habitat restoration. Management goals would require very large hatchery programs that may not be cost effective (Rieman and Apperson 1989).

Genetic variability is necessary for long term survival.. Decreased genetic variability due to a small founding population can reduce growth and survival and increase vulnerability to disease and other stresses such as habitat degradation and introduced species (Allendorf and Leary 1988; Rieman and Apperson 1989). This may be the basis of poor hatchery results from stocking of hatchery cutthroat trout in Idaho (Id.).

Supporting isolated populations with low population numbers by supportive breeding in hatcheries can often be counterproductive. Although improving total population size of the wild trout population it can lead to serious depletion of genetic variability (Ryman and Laikre 1991). Supportive breeding may actually accelerate both inbreeding and genetic heterozygosity (Ryman et al. 1995).

In Montana, the original WCT broodstock was founded from 15 adult pairs. "Within a few generations the population was extremely inbred, exhibited developmental and survival problems, and a high frequency of bilateral asymmetry." (Allendorf and Phelps 1980; Rieman and Apperson 1989). This brood stock was abandoned and a new one created on the advice of geneticists (Leary, et al. 1990).

Because genetic variability occurs among, as well as within populations, the use of any nonindigenous broodstocks including a “state of the art” hybrid broodstock may hasten the decline of locally adapted wild stocks. This has apparently occurred in British Columbia and in Dworshak Reservoir (Rieman and Apperson 1989). The successful introduction of hatchery stocks can dilute the wild gene pool, leading to loss of genetic variation and ultimately survival (Kapuscinski and Phillips 1988; Rieman and Apperson 1989).

Idaho currently maintains two WCT broodstocks, neither of which are genetically pure.

D. Natural catastrophes

Floods, landslides, and fires are natural processes that may add sediments and nutrients to streams and may impact stream morphology and water quality. While they are natural processes, the occurrence and severity of fires, floods, and landslides have been exacerbated throughout much of the WCT's current range as a result of logging, road-building, grazing, and other anthrogenic activities. The artificially increased frequency or severity of these events, coupled with the isolated nature of extant WCT populations, increases the likelihood of local extirpations.

STATE AND FOREIGN CONSERVATION EFFORTS

The state of Montana has recently proposed a plan to recover WCT in the headwaters of the Madison River where decimation of rainbow trout by whirling disease has left habitat vacant. The state plans to install barriers to upstream migration on four tributary creeks in 1997 and six or more additional creeks by 2001. These barriers will presumably protect existing and reintroduced populations of WCT from infection and displacement by or hybridization with rainbow, brook, and brown trout migrating from the mainstem.

The long-term benefits of this plan are questionable for several reasons. First, the barriers would aggravate the isolation of headwaters populations, leaving them as or more vulnerable to demographic, stochastic, and genetic risks. Second, any WCT that migrate past the barriers to the mainstem will still be subject to interbreeding with rainbow trout and predation and competition from brook and brown trout that are better adapted to the warmer temperatures that management activities have created in the mainstem. For these reasons, the program as presently envisioned will not be effective in reestablishing a functioning metapopulation that will insure long-term persistence of the WCT in the Upper Missouri Basin.

In addition to the Madison River initiative there are two other restoration plans in the early developmental stages - one in Yellowstone National Park and the other in the Elkhorn Mountains of the Helena and Deerlodge National Forests. These two restoration plans have not been fully developed and a course of action has not been decided at this time. Neither proposal has had a draft environmental assessment completed at this time. The probable success or failure of any of the preceeding three proposals will be unknown for years.

Petitioners are unaware of any other state or foreign conservation efforts directed specifically towards the WCT. The only other action taken has been to modify fishing regulations.

General state and foreign natural resource laws and regulations have not been sufficient to halt the decline in the species or its habitat and, in any event, have limited effect on the federal lands that harbor many of the remaining viable populations. Existing conservation efforts of states and foreign countries are not sufficient to forestall the WCT's foreseeable decline to endangered status.

CRITICAL HABITAT DESIGNATION

Petitioners request that critical habitat be designated for the westslope cutthroat trout throughout its range, pursuant to 16 U.S.C. Sec. 1533(a)(3)(A) and 50 C.F.R. Sec. 424.12. Habitat necessary for the survival and recovery of the species has been destroyed. Today, land use activities threaten many of the highest quality WCT streams and rivers. Critical habitat designation and effective protection measures are necessary to prevent WCT habitat from further degradation and halt the demise of the species.

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